UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., Bldg. 1
Seattle, WA 98115

Refer to:
OSB2000-0337-FEC

January 31, 2002

Mr. David Cox
Federal Highway Administration
The Equitable Center, Suite 100
530 Center St. NE
Salem, Oregon 97301

Re: Biological Opinion for Endangered Species Act Formal Section 7 Consultation and Formal Conference, and Magnuson-Stevens Act Essential Fish Habitat Consultation, for the Oregon Department of Transportation Program of Maintenance Actions for Urgent and Emergency Repairs on Cut and Fill Slopes in Western Oregon

Dear Mr. Cox:

Enclosed is a biological opinion (Opinion) prepared by the National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act (ESA) on the effects of emergency and urgency repairs on cut and fill slopes in western Oregon. In this Opinion, NMFS concludes that the proposed program is not likely to jeopardize the continued existence of ESA-listed species, or destroy or adversely modify designated critical habitats. This Opinion also serves as a conference opinion and concludes that the proposed action would not be likely to jeopardize the continued existence of Lower Columbia River/Southwest Washington (LCR/SWW) coho salmon, a candidate for listing under the ESA, or destroy or adversely modify potential critical habitat, should it be proposed.

Pursuant to section 7 of the ESA, NMFS has included reasonable and prudent measures with non-discretionary terms and conditions that NMFS believes are necessary and appropriate to minimize the potential for incidental take associated with this project. If this conference opinion is adopted as a biological opinion following the potential listing of LCR/SWW coho salmon, these measures and their implementing terms and conditions will apply to this species.

This Opinion also serves as consultation on essential fish habitat for coho salmon and chinook salmon pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act and its implementing regulations (50 CFR Part 600).

NMFS recognizes that the likelihood of road emergencies is high, particularly during winter storms. An emergency is a situation involving an act of God, disasters, casualties, national defense or security emergencies, etc., and includes response activities that must be taken to prevent imminent loss of human life or property. One purpose of this consultation is to provide

conservation measures to minimize the effects of the emergency response action on listed species and their critical habitat. Under no circumstances is this Opinion intended to obstruct an emergency response decision made by the action agency where human life is at stake.

Questions regarding this letter should be directed to Dr. Nancy Munn of my staff in the Oregon Habitat Branch at 503.231.6269.

Sincerely,

for Michael R Crouse

D. Robert Lohn
Regional Administrator

cc: Rose Owens - ODOT Environmental
Greg Apke - ODOT (Biological Opinion)
Sue Chase - ODOT (Biological Opinion)

Endangered Species Act - Section 7 Consultation
&
Magnuson-Stevens Act
Essential Fish Habitat Consultation

Biological Opinion and Conference Opinion

Oregon Department of Transportation
Maintenance Actions for Urgent and Emergency Urgency Repairs
on Cut and Fill Slopes Western Oregon

Agency: Federal Highway Administration

Consultation Conducted By: National Marine Fisheries Service,
Northwest Region

Date Issued: January 31, 2002

Issued by: F.r Michael R Course
D. Robert Lohn
Regional Administrator

Refer to: OSB2000-0337-FEC

TABLE OF CONTENTS

1. ENDANGERED SPECIES ACT

1.1 Background

On December 27, 2000, the National Marine Fisheries Service (NMFS) received a request for Endangered Species Act (ESA) section 7 formal consultation from the Federal Highway Administration (FHWA) for a program of maintenance actions for emergency and urgency repairs on cut and fill slopes in western Oregon. Cut and fill slopes are the slopes above or below roads, and include stream banks where the slope below the road is also the stream bank. Many of the roads in Oregon experience frequent problems with cut/fill slopes that must be routinely repaired by the maintenance districts. Most of these problems are considered emergencies or urgencies because they must be repaired immediately or as soon as practicable to protect public safety. The project applicant is the Oregon Department of Transportation (ODOT). The highway maintenance program is funded through a combination of state and Federal tax dollars, with the mandate of the Federal government that obligates state transportation departments to maintain adequate levels of service. This provides the Federal nexus for the ESA consultation.

A programmatic approach is most effective because program activities are recurrent, involve similar responses by ODOT Maintenance crews, and there is often not enough time before action is needed to be taken for individual consultation. The cut/fill slope repairs are predictable in that they occur every year, routinely affect stream and riparian areas because many roads are located in floodplains, and they involve similar impacts to riparian habitat, water quality, and fish. However, the cut/fill slope repairs are not so predictable that we can predict specific locations or time when the problem will occur.

The effects determination was made using the methods described in *Making ESA Determinations of Effect for Individual or Grouped Actions at the Watershed Scale* (NMFS 1996). The FHWA determined that the proposed action was likely to adversely affect 15 evolutionarily significant units (ESUs) of anadromous salmonids under the jurisdiction of NMFS, including 14 ESA-listed ESUs and one candidate ESU (refer to Table 1 in Section 1.3).

This biological opinion and conference opinion (Opinion) is based on the information presented in the biological assessment (BA) and the result of the consultation process. The consultation process has involved numerous meetings between ODOT biologists and maintenance staff, Oregon Department of Fish and Wildlife biologists, and biologists from NMFS and USFWS. As appropriate, modifications to the proposal to reduce impacts to the listed species were discussed and included in the program.

The objective of this Opinion is to determine whether the program to repair cut/fill slope failures in western Oregon is likely to jeopardize the continued existence of the listed fish species, or destroy or adversely modify critical habitat.

1.2 Proposed Action

1.2.1 Summary of the Proposed Action

The proposed action describes the process for how ODOT will respond to slope cut and fill failures in western Oregon. The process below clearly delineates what types of activities fall under the program, the best management practices that prescribe how ODOT will respond, and the training, monitoring and reporting responsibilities that accompany implementation of the program. No subsequent ESA consultation will be required for individual projects, as long as the project design criteria and best management practices are consistent with description of the proposed action. Triggers for reinitiation of consultation are described in Section 1.8.

The geographic scope of this program is limited to western Oregon, including all land west of the continental divide in the Cascade mountain range, plus streams in southern Oregon that flow to the ocean. This coincides with ODOT's Region 1 (Multnomah, Hood River, Clackamas, Columbia and Washington counties), Region 2 (Clatsop, Tillamook, Yamhill, Marion, Lincoln, Linn, Benton, and Lane counties) and Region 3 (Douglas, Coos, Curry, Josephine, and Jackson counties).

Cut and fill slope failures occur when a slope above or below the road is damaged, threatening the integrity of the road or associated highway structure or facility. The cause of most road cut/fill slope problems is typically heavy winter storm events that result in two main types of road maintenance problems, bank scour and landslides. Bank scour occurs when high flood waters during storms cause erosion of road slopes that are located along streams. Landslides occur when heavy precipitation supersaturates the soil, causing slopes to fail. Culverts can be impacted by both landslides and bank scour, damaging all or part of the culvert, or clogging the culvert such that it threatens further damage to the culvert or road. Such culvert problems are included in the proposed action.

The cut/fill slope problem may be an emergency or urgency for ODOT Maintenance crews, depending on the severity of the problem and threat to public safety. The distinction between emergency and urgency is the response time of the repair; an emergency must be repaired immediately whereas an urgency repair can be delayed. The following sections describe how Maintenance staff determines what is an emergency versus urgency, the process for responding to the problems, measures to minimize and avoid impact to fish resources, and specific best management practices for the different types of cut/fill slope repair situations. The repair of most bank scour emergency problems involves use of riprap. Bioengineering will be implemented for urgent bank scour repairs whenever appropriate for site conditions.

1.2.2 Process for Responding to Maintenance of Cut/fill Slope Problems

Maintenance repairs of cut/fill slope problems are treated differently if they are emergencies versus urgencies, and if the repair must occur during high flow, or can wait until low flow. This process is for the repair of emergency or urgency cut/fill slope problems. The routine

maintenance of cut and fill slope problems is not covered by this program. Those activities are addressed in the Routine Road Maintenance Manual.

The purpose of the repair is to stabilize the road and protect public safety. ODOT Maintenance will permanently stabilize the road and associated stream bank during an emergency, usually using riprap. Urgency repairs are likely to have sufficient time for coordination with geo/hydro and environmental staff, and would be conducted during the in-water work period when possible. However, it may be necessary to conduct the repair without this level of planning and prior to the in-water work period to protect the road and public safety. During an urgency and when hydraulically practicable and safe, ODOT will stabilize the road with some level of bioengineering, based on best professional judgement of ODOT's Geo/Hydro staff. If the urgent repair combined with bioengineering would exceed $25,000, ODOT Maintenance will temporarily stabilize the road and stream bank, usually with riprap and/or reseeding. The permanent repair using bioengineering may be proposed for the State Transportation Improvement Program (STIP-projects funded for construction, as approved by the Oregon Transportation Commission), based on project prioritization described below in Section 1.2.7.

At this time, the cost of bioengineering solutions for these cut and fill repair project generally exceeds ODOT's maintenance budget, and the designs can take more time than is generally available in an emergency or even sometimes an urgency situation. ODOT has provided funding from the construction program for the construction of certain emergency and urgency maintenance repairs where bioengineering solutions or other site remediation are required and the cost of the repair and bioengineering exceeds $25,000. Sometimes, urgency problems will not require an immediate repair but be put on hold while the project is proposed for STIP processing. The maintenance repairs with bioengineered solutions will be evaluated for the 2004-07 STIP. Most emergency and urgency maintenance problems, however, will require some sort of interim repair to prevent further damage to the structure and protect public safety prior to a final repair as a STIP project.

When a cut/fill slope failure occurs, ODOT Maintenance will assess the problem to determine the timing of the repair. There are three possible outcomes:

1. Emergency - Repair cannot wait for lower river or stream flows.
2. Urgency - Conduct repair during lower flow but cannot wait more than one year.
3. STIP repair - Repair can wait 1 to 4 years for STIP process.

The process by which a maintenance project will be proposed for the STIP includes several levels of review. The first level is the semi-annual Maintenance Monitoring meetings during which time NMFS, USFWS, ODFW, and ODOT work together to determine which projects should be allocated ODOT Maintenance site remediation funds and which should be deferred and recommended for the STIP. This interagency Maintenance Monitoring group will evaluate the recently completed emergency and urgency cut/fill repairs to determine if the repair adversely impacted properly functioning fish habitat. If site remediation is warranted, those projects in which the cost of the site remediation combined with the repair would exceed

$25,000 may be proposed for the STIP. Those projects in which the cost of site remediation is less than $25,000 or which were not included on the STIP, will be considered for site remediation with ODOT Maintenance's site remediation funds (not to exceed $50,000 total per biennium for the program in western Oregon, beginning with the 2001-2003 biennium).

The next step in the process by which a Maintenance project is considered for the STIP involves recommendations from the District, Assistant District, and Frontline managers, and then finally recommendations by the Oregon Transportation Commission.

The person determining whether the action is an emergency is the District Manager responsible for the road. If the problem occurs during off-hours and is an immediate threat to public safety, then it is usually the local, on-call Transportation Maintenance Manager (TMM) who must immediately assess the situation. This individual will usually coordinate with Geo/Hydro staff, at all hours (if appropriate and as time allows), to assess the urgency of the problem and develop a design, using best professional judgement. During an urgency situation, if time allows, this individual will consult with other ODOT engineers, ODOT environmental staff, and regulatory agency biologists.

1.2.3 Definition of Localized Bank Scour

Some of the most common roadway maintenance problems occur along roads that are located along the bank of a stream, in which the toe of slope is within the 2-year floodplain. As the stream course meanders, water can cause undercutting of the road or can undermine the road prism causing sink holes or slumps. Roadway structures, such as riprap and retaining walls, are damaged during bank scour events. Culvert repairs are addressed in Section 1.2.4 below. Repairs to bridges are not included in this consultation.

Bank Scour Emergencies

Bank scour emergencies are bank scour problems where the repair must be conducted immediately to prevent further damage to the road or the structure and to protect the public. These emergencies usually occur during a storm and are inherently dangerous and precarious. The repair usually involves placement of riprap to stabilize the bank. Bioengineered solutions are not possible because there is not enough time for design and procurement of materials. Riprap is also the safest method of quickly and effectively stabilizing a bank during high flow event. ODOT will implement the Conditional Best Management Practices (BMPs) listed in *Section 1.2.5* of this Opinion whenever safely possible and feasible in the time frame of the emergency, and will implement the Mandatory BMPs listed in *Section 1.2.6* of this Opinion.

Bank Scour Urgencies

Bank scour urgencies are bank scour problems where the repair can wait until the high flow event has subsided, but must be repaired before the next high flow to prevent further damage to the road or structure and to protect public safety. There is more time for design and environmental review than during emergencies. Many urgency repairs have sufficient time for planning and can be conducted during the in-water work period. If the repair is more urgent and

the road or associated facility would be expected to fail prior to the in-water work period, then work will be conducted as soon as it is necessary. In either case, Maintenance Managers will consult with Geo/Hydro staff to discuss a design for the repair. They will also consult with ODOT Environmental staff if there is sufficient time. Geo/Hydro staff will propose bioengineered designs for bank scour repairs whenever possible. Interim measures may be implemented if erosion or sediment control is needed prior to the repair. ODOT will implement the Conditional Best Management Practices and the Mandatory Best Management Practices.

Bank Scour STIP Processing

The repair will be deferred for the STIP if: 1) It is a candidate for bioengineering, 2) the bioengineered repair would exceed $25,000, and 3) the repair can wait for the 1-4 year processing. As a STIP job, it would be coordinated by a Project Development Team, not Maintenance Operations. The design would include some level of bioengineering and the work would be conducted during the in-water work period. ODOT would prepare contract specifications for the implementation of the Conservation Measures (refer to Appendix B and C). However, most cut/fill slope problems would require some sort of interim repair to prevent further damage to the structure and protect public safety. ODOT Maintenance would follow the BMPs for the interim repair. If the repair cannot wait for STIP processing or the design (potentially including bioengineering) is less than $25,000, it will be conducted by ODOT Maintenance Operations, and treated as an emergency or urgency.

1.2.4 Definition of Emergency Landslides and Debris Flows

Sinks, slumps, landslides, and debris flows are all types of recurring maintenance problems that involve similar repairs and BMPs when they are caused by a cut/fill slope failure. They occur when the land surface moves, usually by saturation or high water. A sink, slump or debris flow may cause a landslide. For all these problems, the maintenance solution typically requires clearing the road or culvert that is obstructed by natural material. Most of these activities are considered emergencies because they limit use of the highway and are often a threat to public safety. However, there is a possibility that a landslide may be considered an urgency if the repair can wait and it is necessary to wait for lower flow, or if the repair can be delayed and proposed for STIP processing. As such, interim BMPs will be implemented as necessary to minimize erosion and sedimentation.

Types of natural materials that may need to be cleared include soil, rocks, trees, and other vegetation. However, sometimes roadbed structure must also be cleared, such as asphalt, concrete, riprap, or shoulder rock. The maintenance activities involved with removing and clearing the impeding material has the potential to result in erosion and sedimentation into a nearby stream. ODOT will implement the Conditional BMPs whenever safely possible and feasible in the time frame of the emergency, and will implement the Mandatory BMPs.

To minimize degradation of aquatic habitat, ODOT Maintenance will only remove landslide material that falls into a stream if work is already being conducted in the stream to protect the road from further damage or to protect public safety. ODOT will permanently stabilize exposed

soil that has fallen onto the streambank, both within and outside of the ODOT right-of-way (ROW). The permanent stabilization within the ROW will include erosion controls and reseeding. The permanent stabilization outside of the ROW will be limited to reseeding. ODOT will evaluate if additional site remediation is warranted during semi-annual meetings with NMFS, USFWS, ODFW, and ODOT, when ODOT's Maintenance Site Remediation funds will be allocated and STIP projects will be proposed.

Only the clearing of material to open a road or protect a structure is included in this consultation. Maintenance actions that involve clearing natural stream or ocean drift material (in freshwater streams), or cleaning debris from an accident out of a stream, are not covered unless they are associated with a cut/fill slope problem. Those actions are covered under the *Routine Road Maintenance Manual*.

1.2.5 Definition of Emergency/Urgency Culvert Maintenance

ODOT Maintenance personnel routinely have to repair or replace a damaged culvert as a part of bank scour or landslide repairs, or if a damaged culvert is a threat to further road damage and public safety. Culvert problems associated with cut/fill failures are included in this program. If the culvert problem is associated with a landslide, slump, or debris flow, it will be treated as an emergency, as with other landslide, slumps and debris flows.

A problematic culvert may be associated with bank scour, such as inlet and outlet scour and scours that wash out roadbed fill material around a culvert. During emergencies and urgencies, ODOT Maintenance will coordinate with ODFW for advice on improving fish passage. Fish passage will be improved if: 1) The repair is within ODOT's ROW; 2) the repair can be safely constructed; 3) suitable materials are readily available; and 4) there is sufficient time to coordinate with ODFW and ODOT Geo/Hydro staff, obtain materials, and implement the repair.

During STIP projects, culverts are being designed according to ODFW fish passage criteria, and the design of each culvert is coordinated with an ODFW biologist. ODOT policy requires that all projects that involve changes to the hydrology of streams are to be designed by a licensed professional engineer. However, upgrading culverts for fish passage will be implemented under ODOT's Oregon Plan Culvert/Fish Passage Program and not necessarily during the emergency and urgency maintenance repairs.

ODOT Maintenance will replace culverts generally by excavating the road bed above the culvert. ODOT will implement the BMPs applicable to the severity of the problem (emergency, urgency, or STIP). If fish passage is degraded by the repair or is inadvertently impeded by the repair, the project will be added to the ODOT Oregon Plan Culvert/Fish Passage Program. It will be repaired according to the prioritization schedule of ODFW and according to ODFW fish passage guidelines. ODOT will evaluate if a repair project impeded fish passage and if site remediation is warranted during semi-annual meetings with NMFS, USFWS, ODFW, and ODOT.

1.2.6 Conditional Best Management Practices

Conditional BMPs will be implemented, as applicable, in emergency or urgency situations in addition to those listed in ODOT's *Routine Road Maintenance Manual*. These measures are considered conditional because these are practices that ODOT Maintenance will do when feasible, such that public and worker safety would not be jeopardized, materials could be obtained with the time frame of the emergency repair, and the prompt reopening the road for transportation is not jeopardized. Conditional BMPs for emergencies and urgencies are listed in Appendix B. Interim BMPs for urgency repairs or STIP proposals are also listed in Appendix B. The BMPs minimize and avoid direct and indirect impacts to fish and riparian habitat.

1.2.7 Mandatory Best Management Practices

All mandatory BMPs are in addition to those listed in ODOT's *Routine Road Maintenance Manual*, as applicable to emergency or urgency situations. These measures are considered mandatory because these are standard ODOT Maintenance practices to minimize environmental impacts. These practices are often required to satisfy other regulations as well as ESA (such as NPDES permits and Section 404 of the Clean Water Act). Mandatory BMPs for emergencies and urgencies are listed in Appendix C.

1.2.8 STIP Repairs and STIP Remediation

For those projects authorized for STIP processing, the repair or remediation will occur 1-4 years after the emergency or urgency cut/fill slope event and after the site has been temporarily stabilized. After being authorized as a STIP job, a Project Team will be assigned and will oversee the design and implementation of the repair or remediation. Mandatory measures (refer to Appendix A) will be implemented for such projects that are processed by the STIP, through incorporation into contract documents, as appropriate for the site-specific project. These are standard measures that have been designed by a cooperative effort between ODOT Biologists and ODOT Contract Specifications writers to avoid and/or minimize project impacts to listed aquatic species and their habitats. STIP projects are not implemented by Maintenance staff, and therefore project specifications for site remediation would be determined by the Project Team, rather than by the Maintenance Monitoring team. The Project Team will determine which of these standard conservation measures are applicable, and will coordinate with ODFW, NMFS, USFWS as needed. Additional measures may be included, as agreed upon by ODOT, ODFW, NMFS and/or USFWS.

1.2.9 Program Implementation

<u>Employee Training</u>
Part of the "best professional judgement" utilized by ODOT when responding to an emergency or urgency repair involves consideration of many issues, including environmental concerns such as fish habitat. ODOT has several modes of environmental education, including the trial Environmental Learning Program in Region 3, short courses in various environmentally-

responsible construction methods (such as culvert modifications for fish passage), and ODOT's new Roles and Responsibility Program that includes consideration of the environment in addition to safety, budget, and schedule.

Maintenance Managers have participated in the discussions on practices that affect fish resources and alternatives to minimize impacts. District Managers (DM), Assistant District Managers (ADM), frontline managers (including Transportation Maintenance Managers and Region Maintenance and Operations Managers) attended monthly meetings during the development of the BA.

The Region 3 Environmental Learning Program has three main components: Area Environmental Committee meetings, Environmental Crew meetings, and a monthly environmental reporting form. The intent is for region maintenance and construction crews to learn about and stay current with the various internal and external environmental issues affecting ODOT. The Environmental Committee meetings are held quarterly. The Environmental Committee consists of the Region Environmental Coordinator and representatives from HazMat, DMs, ADMs, frontline managers, Construction, and Technical Services. Using feedback provided by the monthly environmental reporting form, the committee determines which environmental issues the crews need help with and compile information about these topics. These environmental learning topics are then discussed at the monthly Environmental Crew meetings. The purpose of this meeting is to disseminate information, review environmental actions, and provide a forum for continuous learning. This is also a time in which maintenance crews discuss environmental mistakes and determine what can be done to avoid them again, and to share ideas about how environmental requirements will be met efficiently and without delay.

The Maintenance Managers oversee each of the meetings. Region Environmental Coordinators and biologists attend the meetings and provide resource information, as needed. At some point in the future, the Environmental Learning Program will be implemented in other regions after it has been evaluated for effectiveness in Region 3.

ODOT Geo/Hydro staff have begun receiving training on bioengineering practices and fluvial hydrogeomorphology, including the Rosgen stream survey methodology and various types of bioengineering designs for streambank stabilization. Other training has occurred for biostabilization and the adequacy of naturally-vegetated stream embankments for stabilization of banks.

ODOT will hold roll-out sessions with District Managers to describe this Opinion and their responsibilities, using the forums described above. The District Managers are responsible for implementing the program and providing training to their staff. Environmental issues are now being discussed at all maintenance meetings, and this consultation and the specific BMPs will be addressed at many of meetings.

Monitoring

ODOT will hold semi-annual Maintenance Monitoring meetings to review the emergency and urgency cut/fill Maintenance program. The meetings will include appropriate representatives from each affected Maintenance District, District Managers, Geo/Hydro staff, ODOT biologists, ODFW, NMFS, and USFWS. The goals of the meetings are to track repairs, discuss adaptive management, and plan site remediation. One meeting will be held in the spring, after the peak storms have subsided. During that meeting, the group will review emergency and urgency repairs that were conducted during the previous season and since the last meeting. The next meeting will be held in the fall, during which time the group will review emergency and urgency repairs that were conducted since the last meeting and propose site remediation. To prepare for the meetings, ODOT Maintenance and Environmental staff will track emergency and urgency cut/fill slope repairs throughout the year, as described below.

ODOT Maintenance Monitoring

Each Maintenance Manager will document and keep an updated file to be used for the semi-annual meetings. They will track each emergency and urgency bank scour, landslide, or culvert repair involving a cut/fill slope, by preparing a Oregon Division of State Lands (DSL) Emergency Authorization application and documenting the additional environmental information described below. The DSL Emergency Authorization application is currently being submitted to ODOT statewide permit specialists for reporting when an emergency maintenance action resulted in an impact to streams, rivers, and lakes. As such, Maintenance Managers are already in the practice of reporting on emergency actions. However, to ensure consistent reporting across all Maintenance Districts and to ensure that issues specific to this consultation are addressed, Maintenance Managers will track all emergency and urgency Maintenance actions that resulted in landslide or bank scour armoring. The reporting decision will follow these guidelines, but will also be based on the best professional judgement of the Maintenance Manager responding to the problem. Routine maintenance of roads that are not considered emergency or urgency situations will not be tracked, unless there are numerous incidents along a single reach of a stream. The DSL form identifies date and location of action, Maintenance Manager's name, need for the repair and consequences of no action, and a brief summary of the repair that was implemented. Additional information that will be tracked includes name and date of ODOT Geo/Hydro, ODOT Environmental, and ODFW staff consulted with, justification as emergency or urgency or deferral, and the following (when applicable):

- Each project in which riprap is used, including amount, size, quality, and justification for its use.
- Whenever end dumping of riprap is employed, including justification for why riprap was not individually placed.
- Each project where adequate containment measures could not be employed.

It will be the responsibility of each Maintenance Manager to track the required information.

Biological Monitoring

ODOT biologists and/or Region Environmental Coordinators will track maintenance emergencies and urgencies which they are involved in. They will keep an updated file on the following:

- Each emergency or urgency bank scour, landslide, or culvert repair involving a cut/fill slope problem that they visited and provided recommendations for, including date of site visit, location, responsible ODOT Maintenance Manager, nature of the problem, and brief summary of recommendations by Environmental staff, ODFW, NMFS, and/or USFWS, if given.
- Each project in which instream work isolation was advised and if fish removal was conducted.
- ODOT biologists will monitor the success of remediation projects (such as revegetation survivorship or coverage, permanent erosion and sediment control, and fish habitat establishment, if proposed).

Monitoring Meeting

To prepare for the meetings, each Maintenance Manager will coordinate with the ODOT Region biologist to summarize the emergency or urgency cut/fill slope repairs that were conducted during the prior 6-month period. Maintenance Managers will provide the biologist with DSL forms or other descriptions of the maintenance repairs. The semi-annual meetings will be facilitated by the Office of Maintenance, with support from ODOT biologists. The agenda for each of the semi-annual monitoring meetings will include the following actions:

- Review emergency and urgency repairs that were conducted during the previous season and since the last meeting.
- Categorize repairs as permanent, temporary (requiring additional stabilization), or requiring site remediation.
- If the repair was temporary, Maintenance and Geo/Hydro will identify which may be permanently repaired with bioengineering.
- Draft a list of projects that will be proposed for STIP repair or STIP remediation, and projects that may qualify for Maintenance site remediation fund.
- Finalize the list of recommended projects for STIP repair or STIP remediation, and determine which projects will be allocated for the Maintenance site remediation fund.
- Propose site remediation plans for projects to be remediated from the Maintenance site remediation fund, which will include identifying which District Manager will oversee the site remediation activities and which Maintenance crews will conduct the work.
- Review results of site remediation (implemented by ODOT Maintenance and monitored by ODOT biologists or Region Environmental Coordinators) that was conducted the previous year.

After the fall meetings, the District Manager will be responsible for forwarding the STIP recommendation list through the process and ultimately to the Oregon Transportation Commission, who will determine which projects are incorporated into the STIP. The District

Manager is also responsible for tracking which projects become approved for STIP repair and/or site remediation.

1.2.10 Site Remediation

ODOT Maintenance Districts have ongoing practices of improving streambanks along ODOT highways. They have completed over 30 projects to improve riparian habitat around the state since 1997. Projects include erosion control, re-seeding, bank stabilization, stream bank restoration, ditch restoration, and slide restoration. Costs associated with these projects have exceeded $450,000 in the last 3 years. Region 3 Maintenance Districts are incorporating native grass seed and native riparian shrubs for streambank revegetation projects whenever possible. All ODOT Maintenance Districts are also improving fisheries habitat with their existing program to make large woody material available for restoration projects. Examples include root wads, large wind throws, danger trees felled but retained in flood prone areas, and sorting massive debris piles for usable logs. To date, large woody material has been provided for 11 stream restoration projects in Regions 1, 2 and 3.

Starting with the 2001-2003 biennium, the Office of Maintenance will provide $50,000 per biennium ($25,000 per year) for site remediation of emergency and urgency repairs in Regions 1, 2, and 3 that result in adverse impacts to fish habitat. This fund is separate from and in addition to existing and ongoing habitat improvement activities, as described above. The evaluation and recommendations of how to allocate the these funds will be a coordinated effort by NMFS, USFWS, ODFW, and ODOT during semi-annual meetings. If the total cost of the repair and the site remediation is greater than $25,000, it may be proposed for the STIP.

The intent of site remediation is to return the local system to the conditions that existed prior to the maintenance repair, or, if possible, aid in the restoration of properly functioning habitat. Site remediation could entail revegetating stream banks or installing habitat features that were impacted by the maintenance repairs of cut/fill slope failures, within the scale of the impact of the repair. Plans for site remediation will be discussed and reviewed by the Maintenance Monitoring group, during the spring and fall meetings. The recommendations may be for remediation of individual emergency maintenance actions, groups of actions along a stream reach, or other groupings of actions to be determined by the Maintenance Monitoring group.

Native species will be used to revegetate areas. Plant materials will include seed, local cuttings, rooted bare-root or container-stock, depending on what is planned during the meetings. Plantings will generally follow ODOT Standard Specifications and the Special Provisions. Site remediation may also entail installing special habitat features, such as large woody material androot wads. The appropriate District Manager will act as project team leader for the site remediation actions. An ODOT biologist will be involved with the site remediation activities and will monitor success.

1.3 Biological Information and Critical Habitat

The action area is defined by NMFS regulations (50 CFR 402) as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." The action area is western Oregon, specifically any streams that may contain anadromous salmonids in ODOT's Regions 1, 2 and 3. Essential habitat features for salmonids are: (1) Substrate; (2) water quality; (3) water quantity; (4) water temperature; (5) water velocity; (6) cover/shelter; (7) food (juvenile only); (8) riparian vegetation; (9) space; and (10) safe passage conditions (50 CFR 226). The proposed action may affect all of these essential habitat features.

References for further background on listing status, biological information and critical habitat elements can be found in Table 1.

Table 1. References for additional background on listing status, biological information, and critical habitat elements for the listed and proposed species addressed in this biological opinion.

Species	Listing Status	Critical habitat	Biological Information, Population Trends
Snake River sockeye salmon	Endangered November 20, 1991, 56 FR 58619	December 28, 1993, 58 FR 68543	Waples *et al.* 1991a; Burgner 1991; ODFW and WDFW 1998
Southern Oregon/Northern California coho salmon	Threatened June 18, 1997, 62 FR 33038	May 5, 1999 64 FR 24049	Weitkamp *et al.* 1995; NMFS 1997a; Sandercock 1991; Nickelson *et al*. 1992
Oregon Coast coho salmon	Threatened August 10, 1998 63 FR 42587	February 16, 2000 65 FR 7764	Weitkamp *et al.* 1995; Nickelson *et al*. 1992; NMFS 1997b; Sandercock 1991
Lower Columbia River/Southwest Washington coho salmon	Candidate November 3, 2000 65 FR 66221		Weitkamp *et al.* 1995
Upper Columbia River steelhead	Endangered August 18, 1997, 62 FR 43937	February 16, 2000 65 FR 7764	Busby *et al.* 1995; Busby *et al.* 1996; ODFW and WDFW 1998
Snake River Basin steelhead	Threatened August 18, 1997, 62 FR 43937	February 16, 2000 65 FR 7764	Busby *et al.* 1995; Busby *et al.* 1996; ODFW and WDFW 1998
Lower Columbia River steelhead	Threatened March 19, 1998, 63 FR 13347	February 16, 2000 65 FR 7764	Busby *et al.* 1995; Busby *et al.* 1996; ODFW and WDFW 1998
Upper Willamette River steelhead	Threatened March 25, 1999, 64 FR 14517	February 16, 2000 65 FR 7764	Busby *et al.* 1995; Busby *et al.* 1996; ODFW and WDFW 1998
Middle Columbia River steelhead	Threatened March 25, 1999, 64 FR 14517	February 16, 2000 65 FR 7764	Busby *et al.* 1995; Busby *et al.* 1996; ODFW and WDFW 1998

Species	Listing Status	Critical habitat	Biological Information, Population Trends
Columbia River chum salmon	Threatened March 25, 1999, 64 FR 14508	February 16, 2000 65 FR 7764	Johnson *et al.*1997; Salo 1991; ODFW and WDFW 1998
Snake River fall-run chinook salmon	Threatened April 22, 1992, 57 FR 14653	December 28, 1993, 58 FR 68543	Waples *et al.* 1991b; Healey 1991; ODFW and WDFW 1998
Lower Columbia River chinook salmon	Threatened March 24, 1999, 64 FR 14308	February 16, 2000 65 FR 7764	Myers *et al.*1998; Healey 1991; ODFW and WDFW 1998
Snake River spring/summer-run chinook salmon	Threatened April 22, 1992, 57 FR 14653	December 28, 1993, 58 FR 68543 and October 25, 1999, 64 FR 57399	Matthews and Waples 1991; Healey 1991; ODFW and WDFW 1998
Upper Willamette River chinook salmon	Threatened March 24, 1999, 64 FR 14308	February 16, 2000 65 FR 7764	Myers *et al.*1998; Healey 1991; ODFW and WDFW 1998
Upper Columbia River spring-run chinook salmon	Endangered March 24, 1999, 64 FR 14308	February 16, 2000 65 FR 7764	Myers *et al.*1998; Healey 1991; ODFW and WDFW 1998

1.4 Evaluating the Proposed Action

The standards for determining jeopardy are set forth in section 7(a)(2) of the ESA as defined by 50 CFR Part 402 (the consultation regulations). NMFS must determine whether the action is likely to jeopardize the listed species and/or whether the action is likely to destroy or adversely modify critical habitat. This analysis involves the initial steps of defining the biological requirements and current status of the listed species and evaluating the relevance of the environmental baseline to the species' current status.

Subsequently, NMFS evaluates whether the action is likely to jeopardize the listed species by determining if the species can be expected to survive with an adequate potential for recovery. In making this determination, NMFS must consider the estimated level of mortality attributable to: (1) Collective effects of the proposed or continuing action, (2) the environmental baseline, and (3) any cumulative effects. This evaluation must take into account measures for survival and recovery specific to the listed salmon's life stages that occur beyond the action area. If NMFS finds that the action is likely to jeopardize the listed or proposed species, NMFS must identify reasonable and prudent alternatives for the action.

Furthermore, NMFS evaluates whether the action, directly or indirectly, is likely to destroy or adversely modify the listed species' proposed or designated critical habitat. The NMFS must determine whether habitat modifications appreciably diminish the value of critical habitat for both survival and recovery of the listed species. The NMFS identifies those effects of the action that impair the function of any essential element of critical habitat. The NMFS then considers whether such impairment appreciably diminishes the habitat's value for the species' survival and recovery. If NMFS concludes that the action will destroy or adversely modify critical habitat it must identify any reasonable and prudent measures available.

For the proposed action, NMFS' jeopardy analysis considers direct or indirect mortality of fish attributable to the action. NMFS' critical habitat analysis considers the extent to which the proposed action impairs the function of essential elements necessary for migration, spawning, and rearing of the listed species under the existing environmental baseline.

1.4.1 Biological Requirements

The first step in the methods NMFS uses for applying the ESA section 7(a)(2) to listed salmon is to define the species' biological requirements that are most relevant to each consultation. NMFS also considers the current status of the listed species taking into account population size, trends, distribution and genetic diversity. To assess to the current status of the listed species, NMFS starts with the determinations made in its decision to list the species for ESA protection and also considers new data available that is relevant to the determination.

The relevant biological requirements are those necessary for salmonids to survive and recover to naturally reproducing population levels at which protection under the ESA would become unnecessary. Adequate population levels must safeguard the genetic diversity of the listed stock, enhance its capacity to adapt to various environmental conditions, and allow it to become self-sustaining in the natural environment.

For this consultation, the biological requirements are improved habitat characteristics that function to support successful spawning, incubation and migration, rearing habitat and over-wintering refugia. Salmon survival in the wild depends upon the proper functioning of certain ecosystem processes, including habitat formation and maintenance. Restoring functional habitats depends largely on allowing natural processes to increase their ecological function, while at the same time removing adverse impacts of current practices. In conducting analyses of habitat-altering actions, NMFS usually defines the biological requirements in terms of a concept called Properly Functioning Condition (PFC) and utilizes a "habitat approach" for its analysis (NMFS 1999). The current status of listed salmonids in western Oregon, based upon their risk of extinction, has not significantly improved since the species were listed. The NMFS is not aware of any new data that would indicate otherwise.

1.4.2 Environmental Baseline

Regulations implementing section 7 of the Act (50 CFR 402.02) define the environmental baseline as the past and present impacts of all Federal, state, or private actions and other human activities in the action area. The environmental baseline also includes the anticipated impacts of all proposed Federal projects in the action area that have undergone section 7 consultation, and the impacts of State and private actions that are contemporaneous with the consultation in progress. The action area is defined in 50 CFR 402.02 to mean "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action."

For the purposes of this consultation, the action area includes all waters along roads within the jurisdiction of the State of Oregon and within the range of listed salmon and steelhead. The action area may also extend upstream or downstream, based on the potential of the permitted activities to impair fish passage, riparian succession, the hydrologic cycle, the erosion, transportation and deposition of sediments, and other ecological processes related to the formation and maintenance of salmon habitats. Indirect effects may occur throughout the watershed where activities described in this opinion depend on other actions for their justification or usefulness.

The analysis presented in this section is based on the *Oregon State of the Environment Report 2000*, published by the Oregon Progress Board (2000). The *Report* was developed and written by a 23- member team of volunteer scientists and contributors drawn primarily from universities throughout Oregon and led by Dr. Paul Risser, president of Oregon State University. The team's mandate was to describe the conditions and trends of Oregon's environment, identify areas at risk, and suggest environmental indicators to help track environmental progress in the state.

Dozens of individual scientists and agency staff offered assistance and advice to the scientific team working on the *Oregon State of the Environment Report*. An advisory committee composed of leaders from the business community, the legislature, interest groups, communities, and concerned citizens that met quarterly with the Science Panel to oversee each step of the process. Their work was funded by a broad consortium of public and private sources. Before it was completed, the *Report* was subjected to a thorough scientific review by 24 independent scientists. Consequently, the NMFS concludes that the *Report* contains the best available scientific information on the environmental baseline. The purpose of the remainder of this section is to use substantial highlights of the *Report* to build the context for nondiscretionary measures included in the incidental take statement issued with this opinion, and for discretionary conservation recommendations that FHWA should carry out consistent with its section 7(a)(1) authority.

The *Oregon State of the Environment Report* provides a comprehensive review of Oregon's environmental baseline in terms of natural structure and function that was developed using a combination of analyses of existing data and best professional scientific judgment. Aquatic ecosystems, marine ecosystems, estuarine ecosystems, freshwater wetlands, and riparian ecosystems were among the resources considered. A set of indicators of ecosystem health was proposed for each resource system and as benchmarks for the state's use in evaluating past decisions and for planning future policies to improve Oregon's environment and economy. The *Report* also included findings regarding the environmental health of Oregon's ecoregions and conclusions about future resource management needs. Highlights of the *Report* follow.

Oregon's currently available water supplies are fully or often over allocated during low flow months of summer and fall. In the Willamette Valley and Cascades ecoregions, more than 80 percent of the instream water rights can expect to receive their full allocation in the winter, but only about 25 percent in the early fall. Increased demand for water is linked to the projected 34 percent increase in human population over the next 25 years in the state. Further, some climate

models predict 10 to 25 percent reductions in late spring-summer-early fall runoff amounts in the coming decades.

Water quality was categorized using the Oregon Water Quality Index (OWQI). The OWQI is a large, consistent and reliable data set that covers the state. It is based on a combination of measurements of temperature, dissolved oxygen, biochemical oxygen demand, pH, ammonia and nitrate nitrogen, total phosphorus, total solids and fecal coliform. Because water quality is influenced by streamflow, water quality indices are measured during high and low flow periods.

Generally, water quality is poor during low flow periods, except in mountainous areas. Instances of excellent or good water quality occur most often in the forested uplands. Poor or very poor water quality occurs most often in the non forested lowlands where land has been converted to agricultural and urban uses. Most ecoregions include some rivers and streams with excellent water quality and other with very poor water quality. Only the Cascades ecoregion has excellent water quality overall as shown by average OWQI measurements. The Willamette Valley ecoregion has poor water quality indices. The effects of pesticides and fertilizers, especially nitrates, on water supplies and aquatic habitats are a significant concern. Almost all categories of water pollution are growing, as are hazardous waste emissions, air pollution, toxic releases, and waste generation.

Oregon's coastal ocean is part of the larger ecological transition zone known as the Northern California Current Large Marine Ecoregion. This area is strongly influenced by both the subarctic waters of the Gulf of Alaska and the warmer, subtropical waters of California. The complexity and natural variability of marine environments makes them difficult and expensive to study and limits the scientific certainty that can be ascribed to assessments of their "ecological health."

The condition of marine fisheries is mixed, with many stocks in good shape and others threatened by overfishing and other pressures. Some species of groundfish have declined to very low levels and the impact of mobile fishing gear on the diversity and productivity of seabed habitats that support groundfish is a concern. The collapse and subsequent closure of the coho salmon fishery have resulted in increased commercial and recreational fishing pressure on nearshore subtidal rocky reef areas, a trend that is likely to continue. Except sea otters, extirpated from the Oregon Coast in the 1800s, pinniped populations have increased and are healthy today. The physical integrity of Oregon's beaches is threatened by the combined effects of erosive winter storms, armoring such as riprap or seawalls built to control erosion, and the gradual rise of sea level along parts of the coast.

Natural variability and extremes in temperature, salinity, tides and river flow make estuarine ecosystems and organisms relatively resilient to disturbance. However, alterations such as filling, dredging, the introduction of nonnative species, and excessive waste disposal have changed Oregon's estuaries, reducing their natural resiliency and functional capacity.

The most significant historical changes in Oregon's estuaries result from the diking, draining and filling of wetlands and the stabilization, dredging and maintenance of navigation channels. Between 1870 and 1970, approximately 50,000 acres or 68 percent of the original tidal wetland areas in Oregon estuaries were lost. Despite these significant historical wetland conversions and continuing degradation by pollutants, nuisance species, and navigational improvement, much of the original habitat that existed in the mid-1800s is still relatively intact and under protection of local zoning plans. Hundreds of acres of former estuarine marshes are now being restored.

Nonnative species now comprise a significant portion of Oregon's estuarine flora and fauna. Some, such as the European green crab, pose serious threats to native estuarine communities. Consumptive use of fresh water in the upper watersheds has reduced freshwater inflow to estuaries by as much as 60 to 80 percent, thus reducing the natural dilution and flushing of pollutants. Other significant concerns include excessive sediment and runoff pollution from local point sources and watershed non-point sources, and pressures associated with population and tourism growth.

Oregon contains approximately 114,500 miles of rivers and streams. No statewide measurements exist of the area of riparian vegetation, although some estimates have been made for more localized regions. Using the conservative estimate of a 100-yard riparian corridor on each side of the stream, the total area of riparian habitats for flowing water in Oregon may be 22,900 square miles. That is equal to approximately 15 percent of the total area of the state.

Healthy riparian areas retain the structure and function of natural landscapes as they were before the intensive land use and land conversion that has occurred over the last 150 to 200 years. Land use activities have reduced the numbers of large trees, the amount of closed-canopy forests, and the proportion of older forests in riparian areas. In western Oregon, riparian plan communities have been altered along almost all streams and rivers.

In the western Cascades, Willamette Valley, Coast Range, and Klamath Mountains, riparian areas on privately owned land are dominated by younger forests because of timber harvest, whereas riparian areas on public lands have more mature conifers. Old coniferous forests now comprise approximately 20 percent of the riparian forests in the Cascades, but only 3 percent in the Coast Range. Older forests historically occurred along most of the McKenzie River, but now account for less than 15 percent of its riparian forests. Along the mainstem of the upper Willamette River, channel complexity has been reduced by 80 percent and the total area of riparian forest has been reduced by more than 85 percent since the 1850s. Downstream portions of the Willamette River have experienced little channel change, but nearly 85 percent of the historical riparian forest has been lost.

Beginning in the early 1800s, riparian areas in eastern and southern Oregon were extensively changed by beaver trapping, logging, mining, livestock grazing, agricultural activities, and associated water diversion projects. Very little of the once extensive riparian vegetation remains to maintain water quality and provide habitat for threatened fish species. Dams have affected flow, sediment, and gravel patterns, which in turn have diminished regeneration and natural

succession of riparian vegetation along downstream rivers. Introduced plant species pose a risk to some riparian habitat by dominating local habitats and reducing the diversity of native species. Improper grazing in riparian areas is another significant threat.

Occurrence of tumors, lesions, and deformities in fish is a direct measure of fish health. Systematic data regarding this problem are not available statewide. In the Willamette River, skeletal deformities comprised less than 5 percent of the sampled population upstream from Corvallis, 20 percent between Corvallis and Newberg, and 56 percent of the sampled population in the Newberg pool.

More than 32 species of freshwater fish have been introduced into Oregon, and are now self-sustaining, making up approximately one-third of Oregon's freshwater fish fauna. Introduced species are frequently predators on native species, compete for food resources, and alter freshwater habitats. In 1998, introduced species were found to comprise 5 percent of the number of species found in the upper Willamette River, but accounted for 60 percent of the observed species in the lower river near Portland.

In its conclusions, the *Oregon State of the Environment Report* makes it clear that despite Oregon's success at resolving resource problems in the past, the existing policies and programs may not be sufficient to address current environmental challenges. Many problems are most critical in lowlands of major river basins, where most Oregonians live and work. Aquatic systems, which integrate many kinds of activities, are most affected and most a risk. Reintroduction of natural processes is important to sustaining biological diversity. Water quality is poor and riparian structure and function has been significantly altered from historical conditions. These and other problems reflect the cumulative effects of many small, diffuse, individual decisions and actions. Finding solutions to these problems will require new approaches to restore and monitor conditions and trends in the environment, like those suggested in the *Report*, as part of an overall statewide sustainability strategy.

For the purposes of this consultation, the environmental baseline at the project site is assumed to be the condition of the site after the landslide or bank scour has occurred. It is assumed to be physically unstable, and a probable source of sediment to the stream.

The NMFS concludes that not all of the biological requirements of the species within the action area are being met under current conditions, based on the best available information on the status of the affected species; information regarding population status, trends, and genetics; and the environmental baseline conditions within the action area. Significant improvement in habitat conditions over those currently available under the environmental baseline is needed to meet the biological requirements for survival and recovery of these species. Any further degradation of these conditions would have a significant impact due to the amount of risk they presently face under the environmental baseline.

1.5 Analysis of Effects

1.5.1 Effects of Proposed Action

Over the short term, highway maintenance repairs to cut and fill slope failures can result in direct and indirect impacts to listed fish. The operation of equipment in the stream has the potential to directly take listed fish, and disrupt normal behavior. Operation of equipment in the channel or in riparian areas increases the risk of a fuel spill which could kill or injure aquatic organisms. In-water work can disturb salmonids through turbidity, noise, contact (or near-contact) with equipment, and compaction and disturbance of instream gravel and riparian areas from heavy equipment. Juvenile fish that may be rearing in the vicinity of the action area would most likely be displaced, and migrating adults may be delayed, injured or killed. Measures can be taken, such as isolation of the work area and choosing appropriate equipment, to minimize the potential for take. These measures or BMPS, as described in the BA and appendices A, B and C of this Opinion, will be implemented by FHWA/ODOT depending on the timing of the repair and the flow conditions at the time of the repair.

Short-term increases in turbidity and sedimentation are likely, although background turbidity will likely be high if the repair is done as an emergency. Larger juvenile and adult salmon appear to be little affected by ephemerally-high concentrations of suspended sediments that occur during most storms and episodes of snow melt. As described below, other research demonstrates that feeding and territorial behavior can be disrupted by short-term exposure to turbid water. At moderate levels, turbidity has the potential to adversely affect primary and secondary productivity, and at high levels, has the potential to injure and kill adult and juvenile fish (Spence et al. 1996). Localized increases of turbidity will likely displace fish in the project area and disrupt normal behavior. The effects are expected to be temporary and localized.

Reported influences of suspended sediment and turbidity influences on fish range from beneficial to detrimental. Elevated total suspended solids (TSS) conditions have been reported to enhance cover conditions, reduce piscivorous fish/bird predation rates (Gregory and Levings 1988), and improve survival. Elevated TSS conditions have also been reported to cause physiological stress, reduce growth, and reduce survival (Bell 1991) and reduce cover for juvenile salmonids (Bjornn and Reiser 1991). Of key importance in considering the detrimental effects of TSS on fish are the frequency and the duration of the exposure (not just the TSS concentration).

Behavioral avoidance of turbid waters may be one of the most important effects of suspended sediments (Birtwell *et al.* 1984, Scannell 1988). Salmonids have been observed to move laterally and downstream to avoid turbid plumes (McLeay *et al.* 1984, 1987, Sigler *et al.* 1984, Lloyd 1987, Scannell 1988, Servizi and Martens 1991). Juvenile salmonids tend to avoid streams that are chronically turbid, such as glacial streams or those disturbed by human activities, except when the fish need to traverse these streams along migration routes (Lloyd *et al.* 1987).

Exposure duration is a critical determinant of the occurrence and magnitude of physical or behavioral effects (Newcombe and MacDonald 1991). Salmonids have evolved in systems that periodically experience short-term pulses (days to weeks) of high suspended sediment loads, often associated with flood events, and are adapted to such high pulse exposures. When turbidity is localized and brief, there is a low probability of direct mortality because the fish should be aware and agile enough to avoid any equipment used to repair the slope. However, research indicates that chronic exposure can cause physiological stress responses that can increase maintenance energy and reduce feeding and growth (Redding et al. 1987, Lloyd 1987, Servizi and Martens 1991). Newly emerged salmonid fry may be vulnerable to even moderate amounts of turbidity (Bjornn and Reiser 1991). Other behavioral effects on fish, such as gill flaring and feeding changes, have been observed in response to pulses of suspended sediment (Berg and Northcote 1985).

The assumption for this consultation is that the local project site is already unstable and a likely source of sediment to the stream. The proposed action would minimize or remove the point source of sediment. In addition, the BMPs discussed in the biological assessment (refer to Appendices A, B and C of this Opinion) would minimize the amount and duration of sediment reaching the stream through erosion control measures and other measures to minimize the extent of the site disturbed and the proximity of the disturbance to the stream.

Instream use of heavy equipment may compact and disturb stream bed gravels. Compaction and disturbance of stream bed gravels may increase the difficulty of redd excavation and the ability of the gravels to be aerated, reducing egg to fry survival. Cederholm et al. (1997) recommend that heavy equipment work should be performed from the bank, that work within bedrock or boulder/cobble bedded channels should be viewed as a last resort, and that the least damaging equipment such as spider harvesters/log loaders be utilized. This type of language is included in the BMPs to minimize the potential for impacts to stream gravels.

Short-term alterations to the adjacent riparian area to facilitate access to the slope and repair site may result in increases in turbidity and loss of vegetation. The loss of vegetation may result in some small amount of increased solar radiation and subsequent small increase in stream temperature. These effects can be offset with compensatory mitigation, as proposed with the $25,000 per year for plantings and bioengineered[1] repairs to streambanks.

Over the long term, highway maintenance repairs of cut and fill slope failures have the potential to result in changes to instream and riparian habitat. These changes can affect fish survival. Continuous rock riprap revetments used to armor banklines destroy or degrade other bankline features, and the value of rearing habitat along stream banks will be altered as a result of the

[1]For the purpose of this consultation, bioengineering is defined as the use of plant materials and organic structural elements (i.e. root wads, logs, etc) for stabilizing eroding banklines. Vegetation must be the primary structural component, and the use of rock or similar hard material, must be held to a practical minimum and located at scour critical points only.

placement of riprap. By design, the hardening measures transfer and focus hydraulic forces to other areas and erosion of neighboring property can be accelerated. Nearshore topography is scoured, critical fish habitats are often degraded or destroyed. On a reach scale, riparian vegetation and streambed substrate will be lost and there will be a reduction in the future supply of large woody material, resulting in a loss of habitat complexity. Large wood recruitment is eliminated because lateral migration is stopped and less large wood and plants become established than on natural banks (Dykaar and Wigington 2000). Stream and flood plain interactions are reduced, stream channelization is increased, and stream processes essential to support listed fish are lost. The result will be a decline in fish use at the site (Beamer and Henderson 1998, Peters et al. 1998).

At the watershed scale, the continued placement of riprap will lead to a continual degradation of riparian function that is necessary to support viable fish populations. The cumulative effect across a watershed includes a reduction in the input of spawning gravels, changes in substrate characteristics, floodplain abandonment, and a lowering of the water table (Schmetterling et al. 2001).

The effect of landslides and bank scours at a watershed scale is not known. These are natural watershed events that are vital to the development of stream ecosystems. However, the rate and scale of landslides and bank scours can be accelerated by land uses such as forestry operations and road building. At some point, the increased instability contributes to a loss of riparian vegetation and riparian function, and degradation of instream habitats due to increased sediment inputs. The intent of the proposed program is to stabilize the streambank, in addition to rebuilding the road.

The proposed program proposes to offset the unstable streambanks and the riprap placement with compensatory mitigation, including the incorporation of bioengineering into designed repairs. When bioengineered elements are incorporated into the rock, ecosystem processes are enhanced relative to bank hardening without any bioengineering. The root systems are flexible, regenerative, and respond favorably to hydraulic disturbance–characteristics which exceed the performance of conventional geotextile alternatives. Fish habitat is enhanced, compared to riprapped sites, by incorporating root wads and downed trees in the designs, beneficial scour holes are created in acceptable sites, and low energy resting zones are developed downstream of instream structures.

Over the short term (i.e. a winter storm event), this programmatic action will result in an increase in riprap along riparian corridors in western Oregon. However, over the duration of a STIP cycle (5 years), the proposed action should result in the maintenance of riparian conditions over current conditions (after the landslide or bank scour), or a net improvement, through the incorporation of bioengineering and plantings into project designs. Monitoring of riprap placement and the incorporation of bioengineering into designed repairs will validate this conclusion.

1.5.2 Effects on Critical Habitat

NMFS designates critical habitat based on physical and biological features that are essential to the listed species. Essential features for designated critical habitat include substrate, water quality, water quantity, water temperature, food, riparian vegetation, access, water velocity, space and safe passage. Critical habitat for listed anadromous ESUs consists of all waterways below naturally-impassable barriers including the project area. The adjacent riparian zone is also included in the designation. This zone is defined as the area that provides the following functions: Shade, sediment, nutrient or chemical regulation, streambank stability, and input of large woody debris or organic matter. Effects to critical habitat from these activities are included in the effects description in Section 1.5.1 above.

1.5.3 Cumulative Effects

Cumulative effects are defined in 50 CFR 402.02 as "those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation." Other activities within the watershed have the potential to impact fish and habitat within the action area. Future Federal actions, includign the ongoing operation of hydropower systems, hatcheries, fisheries, and land management activities are being (or have been) reviewed through separate section 7 consultation processes.

Non-Federal activities within the action area are expected to increase with a projected 34 percent increase in human population over the next 25 years in Oregon. Thus, NMFS assumes that future private and State actions will continue within the action area, but at increasingly higher levels as population density climbs.

1.6 Conclusion

NMFS has determined, based on the information, analysis, and assumptions described in this Opinion, that the FHWA's proposed action, including the proposed conditional and mandatory best management practices, are not likely to jeopardize the continued existence of the listed salmon and steelhead shown in Table 1. In arriving at this determination, NMFS considered the status of the listed salmon and steelhead, environmental baseline conditions (including the local instability of the site), the direct and indirect effects of approving the action, and the cumulative effects of actions anticipated in the action area. NMFS evaluated the proposed action and found that it would cause short-term degradation of some environmental baseline indicators for listed salmon and steelhead. However, the proposed action is not expected to result in further degradation of aquatic habitats over the long term because of plantings and implementation of bioengineered designs. Thus, the effect of the proposed action would not reduce prespawning survival, egg-to-smolt survival, juvenile rearing, or upstream/downstream migration survival rates to a level that would appreciably diminish the likelihood of survival and recovery of candidate, proposed, or listed fishes, nor is it likely to result in the destruction or adverse modification of critical habitats.

NMFS will reconsider this conclusion after five years to determine if reinitiation of the consultation is required. The decision to reinitiate will be based on the five years of annual monitoring data. If the impacts are greater than expected, or the negative effects of the program outweigh the benefits, then reinitiation will be required.

1.7 Conservation Recommendations

Section 7 (a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Conservation recommendations are discretionary measures suggested to minimize or avoid adverse effects of a proposed action on listed species, to minimize or avoid adverse modification of critical habitat, or to develop additional information. The NMFS does not request any conservation recommendations for this action.

1.8 Reinitiation of Consultation

Consultation must be reinitiated within five years. Additionally, every six months, NMFS will have an opportunity to review data and projects and participate in planning of habitat restoration for cut/fill slope failure sites. If the information provided indicates that the effects of the program to PFC are not adequately minimized or off-set by site restoration activities, then NMFS may request reinitiation of consultation before 5 years have passed. Consultation must also be reinitiated if: The amount or extent of incidental take specified in the Incidental Take Statement is exceeded, or is expected to be exceeded; new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this Opinion; the action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this Opinion; or a new species is listed or critical habitat is designated that may be affected by the action (50 CFR 402.16). In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation. To reinitiate consultation, FHWA should contact the Habitat Conservation Division (Oregon State Office) of NMFS.

2. INCIDENTAL TAKE STATEMENT

Sections 4 (d) and 9 of the ESA prohibit any taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct) of listed species without a specific permit or exemption. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, and sheltering. Harass is defined as actions that create the likelihood of injuring listed species to such an extent as to significantly alter normal behavior patterns which include, but are not limited to, breeding, feeding, and sheltering. Incidental take is take of listed animal species that results from, but is not the purpose of, the Federal agency or the applicant carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to, and not intended as part of, the

agency action is not considered prohibited taking provided that such taking is in compliance with the terms and conditions of this incidental take statement.

An incidental take statement specifies the impact of any incidental taking of endangered or threatened species. It also provides reasonable and prudent measures that are necessary to minimize impacts and sets forth terms and conditions with which the action agency must comply in order to implement the reasonable and prudent measures.

2.1 Amount or Extent of the Take

The NMFS anticipates that the action covered by this Opinion is reasonably certain to result in incidental take of the species listed in Table 1 because of detrimental effects from increased sediment levels (non-lethal) and the potential for direct incidental take during the placement of riprap (lethal and non-lethal) and handling of fish during work area isolation. There is also the potential for harm because of significant habitat modification.

The effects of increased sediment loading, riprap placement and other inwater work are largely unquantifiable and are not expected to be measurable as long-term effects on population levels. The effects of fish handing during work area isolation could result in minor incidental lethal take of listed fish. NMFS anticipates that incidental take will be as follows:

Oregon Coast ESU - Within this ESU, ODOT estimates that 15 projects per year will require fish handling. Each action will likely require the handling of up to up to 50 Oregon coast coho salmon, for an anticipated incidental take of up to 750 juveniles and adults.

Southern Oregon/Northern California ESU - Within this ESU, ODOT estimates that 5 projects per year will require fish handling. Each action will likely require the handling of up to 50 Southern Oregon/Northern California coast coho salmon, for an anticipated incidental take of up to 250 juveniles and adults.

Lower Columbia River ESU - Within this ESU, ODOT estimates that 5 projects per year will require fish handling. Each action will likely require the handling of up to 50 fish, with approximate distribution between the ESUs as follows:

Snake River sockeye salmon - 1
Snake River basin steelhead - 1
Snake River fall-run chinook salmon - 1
Snake River spring/summer-run chinook salmon - 1
Upper Columbia River steelhead - 1
Upper Columbia River spring-run chinook - 1
Middle Columbia River steelhead - 5
Upper Willamette steelhead - 5
Upper Willamette chinook salmon - 5

Lower Columbia River steelhead - 10
Lower Columbia River chinook salmon -10
Columbia River chum - 9

The total anticipated incidental take for projects in the Lower Columbia River ESU may be up to 250 juveniles and adults.

Upper Willamette ESU - Within this ESU, ODOT estimates that 15 projects per year will require fish handling. Each action will likely require the handling of up to 40 fish (20 Upper Willamette steelhead and 20 Upper Willamette chinook salmon), for an anticipated incidental take of up to 600 juveniles and adults.

NMFS anticipates that incidental take of up to 1,850 fish per year could occur as a result of the actions covered by this biological opinion. Actual incidental take is expected to be much lower because weather events resulting in emergency actions generally do not occur in all regions of western Oregon each year.

2.2 Reasonable and Prudent Measures

The NMFS believes that the following reasonable and prudent measures are necessary and appropriate to minimizing take of the above species. Minimizing the amount and extent of take is essential to avoid jeopardy to the listed species.

1. To minimize the amount and extent of incidental take from project activities within and adjacent to program activities, measures shall be taken to limit the duration and extent of ground disturbance and riprap placement, and whenever possible, to schedule such work when the fewest number of fish are expected to be present.

2. To minimize the amount and extent of incidental take from construction activities near the creek, effective erosion and pollution control measures shall be developed and implemented to minimize the movement of soils and sediment both into and within the river, and to stabilize bare soil over both the short term and long term.

3. To minimize the amount and extent of take from loss of instream habitat and to minimize impacts to critical habitat, measures shall be taken to avoid impacts to riparian and instream habitat, or where impacts are unavoidable, to replace lost riparian and instream functions.

4. To ensure effectiveness of implementation of the reasonable and prudent measures, all erosion control measures and plantings for site restoration shall be monitored and evaluated both during and following construction.

2.3 Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, FHWA must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are non-discretionary.

1. To Implement Reasonable and Prudent Measure #1, the FHWA shall ensure that:

    a. Rock will be placed individually and not end dumped whenever possible. Placement will be performed in the dry (during the dry season preferably, or within a work isolation are) as much as possible, and from the top of the bank where possible. Records of end-dumping of rock and volume and extent of rock placement shall be kept.

2. To Implement Reasonable and Prudent Measure #2, the FHWA shall ensure that all erosion control and pollution control measures included in the BA are included as terms and conditions of this consultation. Based on prior project evaluations, the NMFS requires FHWA to give particular attention to the following measures:

    a. Vehicle maintenance, re-fueling of vehicles and storage of fuel shall be done at least 150 feet from the 2-year flood elevation or in an adequate fueling containment area.

    b. At the end of each work shift, vehicles shall be stored greater than 150 feet (horizontal distance) from the 2-year flood elevation, or in an area approved by the ODOT Maintenance Manager.

    c. All erosion control devices will be inspected daily during project activities to ensure that they are working adequately. Work crews will be mobilized to make immediate repairs to the erosion controls, or to install erosion controls during working and off-hours. Should a control measure not function effectively, the control measure will be immediately repaired or replaced. Additional controls will be installed as necessary.

    d. If soil erosion and sediment resulting from construction activities are not effectively controlled, the ODOT Maintenance Manager will limit the amount of disturbed area to that which can be adequately controlled.

3. To Implement Reasonable and Prudent Measure #3, FHWA shall ensure that:

    a. Boundaries of the clearing limits will be flagged. Ground will not be disturbed beyond the flagged boundary.

    b. Alteration of native vegetation will be minimized.

c. Riparian plantings will be completed.

4. To Implement Reasonable and Prudent Measure #4, FHWA shall ensure that:

a. All significant riparian replant areas will be monitored for a minimum 5-year period to insure the following:

i. Finished grade slopes and elevations will perform the appropriate role for which they were designed.
ii. Plantings are growing appropriately and have an adequate success rate. An adequate success rate is 80%.

b. Failed plantings and structures will be replaced, if replacement would potentially succeed. If not, plantings at another appropriate location will be done during the next available planting season.

c. By April 30 of each year, ODOT shall submit to NMFS a monitoring report that addresses the success of erosion control measures and of the plantings. At a minimum, the monitoring report must include photographs of the erosion control measures and plantings, with a short narrative that addresses riparian function. Monitoring reports will be submitted to:

National Marine Fisheries Service
Oregon Habitat Branch, Habitat Division
Attn: OSB2000-0337-FEC
525 NE Oregon Street, #500
Portland, Oregon 97232-2737

d. At least two weeks prior to the spring Maintenance Monitoring meeting, ODOT Maintenance and Environmental staff will submit documentation that tracks emergency and urgency cut/fill slope failures and repairs from the previous year. The report shall be submitted to the address provided in 4 c above. The report shall include a list of failure and repair sites in a tabular format that provide a spatial summary for cumulative effects analyses and baseline tracking.

e. If a dead, sick or injured LCR steelhead or LCR chinook salmon is located, immediate notification must be made to NMFS Law Enforcement, (360-418-4246). Care will be taken in handling sick or injured specimens to ensure effective treatment and care or the handling of dead specimens to preserve biological material in the best possible state for later analysis of cause of death. In conjunction with the care of sick or injured species or preservation of biological material from a dead animal, the finder has the responsibility to carry out instruction provided by Law Enforcement to ensure that evidence intrinsic to the specimen is not unnecessarily disturbed.

3. MAGNUSON-STEVENS ACT

3.1 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), requires the inclusion of essential fish habitat (EFH) descriptions in Federal fishery management plans. In addition, the MSA requires Federal agencies to consult with NMFS on activities that may adversely affect EFH.

EFH means "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (MSA §3). The Pacific Fisheries Management Council (Council) has designated EFH for Federally-managed groundfish (PFMC 1998a), coastal pelagic (PFMC 1998b), and Pacific salmon (PFMC 1999) fisheries.

The MSA requires consultation for all actions that may adversely affect EFH, and does not distinguish between actions within EFH and actions outside EFH. Any reasonable attempt to encourage the conservation of EFH must take into account actions that occur outside EFH, such as upstream and upslope activities, that may have an adverse effect on EFH. Therefore, EFH consultation with NMFS is required by Federal agencies undertaking, permitting or funding activities that may adversely affect EFH, regardless of its location.

The consultation requirements of section 305(b) of the MSA (16 U.S.C. 1855(b)) provide that:

- Federal agencies must consult on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH.
- NMFS shall provide conservation recommendations for any Federal or State activity that may adversely affect EFH.
- Federal agencies shall, within 30 days after receiving an EFH conservation recommendation from NMFS, provide a detailed response in writing to NFMS regarding the conservation recommendations. The response shall include a description of measures proposed by the agency for avoiding, minimizing, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with conservation recommendations of NMFS, the Federal agency shall explain its reasons for not following the recommendations no less than 10-days prior to granting final authorization for the subject action.

3.2 Identification of Essential Fish Habitat

The Pacific Fishery Management Council (PFMC) has designated EFH for federally-managed fisheries within the waters of Washington, Oregon and California. The designated EFH for groundfish and coastal pelagic species encompasses all waters from the mean high water line, and upriver extent of saltwater intrusion in river mouths, along the coasts of Washington, Oregon

and California, seaward to the boundary of the U.S. exclusive economic zone (200 miles) (PFMC 1998a, 1998b). Freshwater EFH for Pacific salmon includes all streams, lakes, ponds, wetlands, and other water bodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by the PDMC), and longstanding, naturally-impassable barriers (i.e., natural waterfalls
in existence for several hundred years) (PFMC 1999). In estuarine and marine areas, designated salmon EFH extends from the nearshore and tidal submerged environments within PFMC is one of eight Regional Fishery Management Councils established under the Magnuson-Stevens Act. The PFMC develops and carries out fisheries management plans for Pacific coast groundfish, coastal pelagic species and salmon off the coasts of Washington, Oregon and California, and recommends Pacific halibut harvest regulations to the International Pacific Halibut Commission.

Pursuant to the MSA, the PFMC has designated freshwater and marine EFH for chinook and coho salmon (PFMC 1999), EFH for five species of coastal pelagic species (PFMC 1998a), and a "composite" EFH for 62 species of groundfish (PFMC 1998b). For purposes of this consultation, freshwater EFH for chinook and coho salmon in Oregon includes all streams, lakes, ponds, wetlands, and other water bodies currently or historically accessible to chinook or coho salmon, except upstream of the following impassable dams: Opal Springs, Big Cliff, Cougar, Dexter, Dorena, Soda Springs, Lost Creek, Applegate, Bull Run, Oak Grove, and the Hells Canyon Complex. In the future, should subsequent analyses determine the habitat above any of these dams is necessary for salmon conservation, the PFMC will modify the identification of Pacific salmon EFH (PFMC 1999). Marine EFH for chinook and coho salmon in Oregon includes all estuarine, nearshore and marine waters within the western boundary of the U.S. Exclusive Economic Zone (EEZ), 200 miles offshore. EFH for coastal pelagic species and composite EFH for groundfish in Oregon includes all waters, substrates and associated biological communities from the mean higher high water line, the upriver extent of saltwater intrusion in river mouths, and along the coast extending westward to the boundary of the EEZ.

3.3 Proposed Action

The proposed action is detailed above in Section 1.2. The proposed action area encompasses all rivers, streams, and estuaries within Oregon. The estuarine and offshore marine waters are designated EFH for various life stages of 62 species of groundfish and 5 coastal pelagic species. A detailed description and identification of EFH for groundfish is found in the Final Environmental Assessment/Regulatory Impact Review for Amendment 11 to The Pacific Coast Groundfish Management Plan (PFMC 1998a) and the NMFS EFH for West Coast Groundfish Appendix (Casillas *et al.* 1998). A detailed description and identification of EFH for coastal pelagic species is found in Amendment 8 to the Coastal Pelagic Species Fishery Management Plan (PFMC 1998b). The proposed action area also encompasses the Council-designated EFH for chinook (*Onchorhynchus tshawytscha*) and for coho (*Onchorhynchus kisutch*) salmon. A description and identification of EFH for salmon is found in Appendix A to Amendment 14 to the Pacific Coast Salmon Plan (PFMC 1999). Assessment of the impacts to these species' EFH from the above proposed FHWA action is based on this information.

The objective of this programmatic EFH consultation is to determine whether the adoption of proposed conditions for the repair of highway slope failures funded by FHWA throughout western Oregon and allowing implementation of those activities without further EFH consultation may adversely affect EFH for the species listed in Table 2. Another objective of this programmatic EFH consultation is to recommend conservation measures to avoid, minimize, or otherwise offset potential adverse impacts to EFH resulting from the proposed road repairs identified in Part 1 above.

3.4 Effects of the Proposed Action

NMFS concludes that the effects of this action on designated EFH are likely to be within the range of effects considered in the Endangered Species Act portion of this consultation.

3.5 Conclusion

Using the best scientific information available, NMFS has determined that the proposed action may adversely affect designated EFH for coho salmon, chinook salmon, coastal pelagic species, and groundfish listed in Table 2.

3.6 EFH Conservation Recommendation

The Reasonable and Prudent Measures presented above in Section 2.2 and the corresponding Terms and Conditions outlined above in Section 2.2 and 2.3 are applicable to designated groundfish, coastal pelagics and salmon EFH. Therefore, NMFS incorporates them herein as EFH conservation recommendations. Should FHWA adopt and implement these recommendations, potential adverse impacts to EFH would be minimized.

3.7 Statutory Requirements

Please note that the Magnuson-Stevens Act (§305(b)) requires that the Federal agency provide a written response to NMFS' EFH recommendations within 30 days of its receipt of this letter and 10 days prior to final authorization of the proposed action. The response must include a description of measures proposed to avoid, minimize, mitigate or offset the adverse impacts of the activity. If the response is inconsistent with NMFS' conservation recommendations, the agency the reasons for not them must be included.

3.8 Consultation Renewal

FHWA must reinitiate EFH consultation with NMFS if the action is substantially revised in a way that may adversely affect EFH, or if new information becomes available that affects the basis for NMFS' EFH conservation recommendations (50 CFR Section 600.920(k)).

Table 2. Species with designated EFH found in waters of the State of Oregon.[2]

Ground Fish Species	Blue rockfish (*S. mystinus*)	Rougheye rockfish (*S. aleutianus*)	Flathead sole (*Hippoglossoides elassodon*)
Leopard shark (*Triakis semifasciata*)	Bocaccio (*S. paucispinis*)	Sharpchin rockfish (*S. zacentrus*)	Pacific sanddab (*Citharichthys sordidus*)
Soupfin shark (*Galeorhinus zyopterus*)	Brown rockfish (*S. auriculatus*)	Shortbelly rockfish (*S. jordani*)	Petrale sole (*Eopsetta jordani*)
Spiny dogfish (*Squalus acanthias*)	Canary rockfish (*S. pinniger*)	Shortraker rockfish (*S. borealis*)	Rex sole (*Glyptocephalus zachirus*)
Big skate (*Raja binoculata*)	Chilipepper (*S. goodei*)	Silvergray rockfish (*S. brevispinus*)	Rock sole (*Lepidopsetta bilineata*)
California skate (*R. inornata*)	China rockfish (*S. nebulosus*)	Speckled rockfish (*S. ovalis*)	Sand sole (*Psettichthys melanostictus*)
Longnose skate (*R. rhina*)	Copper rockfish (*S. caurinus*)	Splitnose rockfish (*S. diploproa*)	Starry flounder (*Platyichthys stellatus*)
Ratfish (*Hydrolagus colliei*)	Darkblotched rockfish (*S. crameri*)	Stripetail rockfish (*S. saxicola*)	
Pacific rattail (*Coryphaenoides acrolepsis*)	Grass rockfish (*S. rastrelliger*)	Tiger rockfish (*S. nigrocinctus*)	**Coastal Pelagic Species**
Lingcod (*Ophiodon elongatus*)	Greenspotted rockfish (*S. chlorostictus*)	Vermillion rockfish (*S. miniatus*)	Northern anchovy (*Engraulis mordax*)
Cabezon (*Scorpaenichthys marmoratus*)	Greenstriped rockfish (*S. elongatus*)	Widow Rockfish (*S. entomelas*)	Pacific sardine (*Sardinops sagax*)
Kelp greenling (*Hexagrammos decagrammus*)	Longspine thornyhead (*Sebastolobus altivelis*)	Yelloweye rockfish (*S. ruberrimus*)	Pacific mackerel (*Scomber japonicus*)
Pacific cod (*Gadus macrocephalus*)	Shortspine thornyhead (*Sebastolobus alascanus*)	Yellowmouth rockfish (*S. reedi*)	Jack mackerel (*Trachurus symmetricus*)
Pacific whiting (Hake) (*Merluccius productus*)	Pacific Ocean perch (*S. alutus*)	Yellowtail rockfish (*S. flavidus*)	Market squid (*Loligo opalescens*)
Sablefish (*Anoplopoma fimbria*)	Quillback rockfish (*S. maliger*)	Arrowtooth flounder (*Atheresthes stomias*)	
Aurora rockfish (*Sebastes aurora*)	Redbanded rockfish (*S. babcocki*)	Butter sole (*Isopsetta isolepsis*)	**Salmon**
Bank Rockfish (*S. rufus*)	Redstripe rockfish (*S. proriger*)	Curlfin sole (*Pleuronichthys decurrens*)	Coho salmon (*O. kisutch*)
Black rockfish (*S. melanops*)	Rosethorn rockfish (*S . helvomaculatus*)	Dover sole (*Microstomus pacificus*)	Chinook salmon (*O. tshawytscha*)
Blackgill rockfish (*S. melanostomus*)	Rosy rockfish (*S. rosaceus*)	English sole (*Parophrys vetulus*)	

4. LITERATURE CITED

[2] From Casillas *et al* 1998, Eschmeyer *et al.* 1983, Miller and Lea 1972, Monaco *et al.* 1990, Emmett *et al.* 1991, Turner and Sexsmith 1967, Roedel 1953, Phillips 1957, Roedel 1948, Phillips 1964, Fields 1965, Walford 1931, Gotshall 1977, Hart 1973, Healey 1991, Sandercock 1991, Bottom *et al.* 1984, Schultz 1953, and Dees 1961.

Beamer, E.M. and R. A. Henderson. 1998. Juvenile salmonid use of natural and hydromodified stream bank habitat in the maintem Skagit River, northwest Washington. Miscellaneous Report. Skagit System Cooperative, LaConner, WA.

Bell, M.C. 1991. Fisheries handbook of engineering requirements and biological criteria. Fish Passage Development and Evaluation Program. U.S. Army Corps of Engineers. North Pacific Division.

Berg, L. and T.G. Northcote. 1985. Changes In Territorial, Gill-Flaring, and Feeding Behavior in Juvenile Coho Salmon (Oncorhynchus kisutch) Following Short-Term Pulses of Suspended Sediment. Canadian Journal of Fisheries and Aquatic Sciences 42: 1410-1417.

Birtwell, I. K., G. F. Hartman, B. Anderson, D. J. McLeay, and J. G. Malick. 1984. A Brief Investigation of Arctic Grayling (*Thymallus arcticus*) and Aquatic Invertebrates in the Minto Creek Drainage, Mayo, Yukon Territory: An Area Subjected to Placer Mining. Canadian Technical Report of Fisheries and Aquatic Sciences 1287.

Bjornn, T.C. and D.W. Reiser. 1991. Habitat requirements of salmonids in streams. Pages 83-138 *in* W.R. Meehan, ed. Influences of forest and rangeland management on salmonid fishes and their habitats. American Fisheries Society Special Publication 19:83-138.

Bottom, D.L., K.K. Jones, and M.J. Herring. 1984. Fishes of the Columbia River estuary. Columbia River Estuary Data Development Program. 113 p.

Burgner, R.L. 1991. Life history of sockeye salmon (*Oncorhynchus nerka*). Pages 1-117 *in* C. Groot and L. Margolis, eds. 1991. Pacific salmon life histories. Vancouver, British Columbia: University of British Columbia Press.

Busby, P., S. Grabowski, R. Iwamoto, C. Mahnken, G. Matthews, M. Schiewe, T. Wainwright, R. Waples, J. Williams, C. Wingert, and R. Reisenbichler. 1995. Review of the status of steelhead (*Oncorhynchus mykiss*) from Washington, Idaho, Oregon, and California under the U.S. Endangered Species Act. 102 p. plus 3 appendices.

Busby, P.J., T.C. Wainwright, G.J. Bryant, L.J. Lierheimer, R.S. Waples, F.W. Waknitz, and I.V. Lagomarsino. 1996. Status review of west coast steelhead from Washington, Idaho, Oregon, and California. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-NWFSC-27. 261p.

Casillas, E., L. Crockett, Y. deReynier, J. Glock, M. Helvey, B. Meyer, C. Schmitt, M. Yoklavich, A. Bailey, B. Chao, B. Johnson, and T. Pepperell. 1988. Essential Fish Habitat West Coast Groundfish Appendix. National Marine Fisheries Service. Montlake, Washington. 778 p .

Cederholm, C.J., L.G. Dominguez, and T.W. Bumstead. 1997. Rehabilitating stream channels and fish habitat using large woody debris. Chapter 8 *in* P.A. Slaney and D. Zaldokas, eds. 1997. Fish Habitat Rehabilitation Procedures. Watershed Restoration Technical Circular No. 9. British Columbia Ministry of Environment, Lands and Parks. Vancouver, BC.

Dykaar, B.D. and P.J. Wigington, Jr. 2000. Floodplain formation and cottonwood colonization patterns on the Willamette River, Oregon, USA. Environmental Management 25:87-104.

Emmett, R.L., S.L. Stone, S.A. Hinton, and M.E. Monaco. 1991. Distribution and abundance of fishes and invertebrates in west coast estuaries, Volume II: species life history summaries. ELMR Report No. 8. NOAA/NOS Strategic Environmental Assessments Division, Rockville, MD. 329 p.

Eschmeyer, W.N., E. S. Herald, and H. Hamman. 1983. A field guide to Pacific coast fishes of North America. Houghton Mifflin Company. Boston, Mass. 336 p.

Fields, W.G. 1965. The structure, development, food relations, reproduction and life history of the squid (*Loligo opalescens* Berry). California Department of Fish and Game. Fish Bulletin 131. 108 p.

Gotshall, D. W. 1977. Fishwatchers' guide to the inshore fishes of the Pacific coast. Sea Challengers. Monterey, California. 108 p.

Gregory, R. S., and C. D. Levings. 1988. Turbidity Reduces Predation on Migrating Juvenile Pacific Salmon. Transactions of the American Fisheries Society 127: 275-285.

Hart, J. L. 1973. Pacific fishes of Canada. Fisheries Research Board of Canada. Bulletin 180. 740 p.

Healey, M.C. 1991. Life history of chinook salmon (*Oncorhynchus tshawytscha*). Pages 311-393 *in* C. Groot and L. Margolis, eds. 1991. Pacific salmon life histories. Vancouver, British Columbia: University of British Columbia Press.

Helfman, G.S. 1981. The advantage to fishes of hovering in shade. Copeia. 1981(2):392-400.

Johnson, O.W., W.S. Grant, R.G. Cope, K. Neely, F.W. Waknitz, and R.S. Waples. 1997. Status review of chum salmon from Washington, Oregon, and California. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-32. 280 p.

Lloyd, D. S. 1987. Turbidity as a Water Quality Standard for Salmonid Habitats in Alaska. North American Journal of Fisheries Management 7:34-45.

Lloyd, D. S., J. P. Koenings, and J. D. LaPerriere. 1987. Effects of Turbidity in Fresh Waters of Alaska. North American Journal of Fisheries Management 7: 18-33.

Matthews, G.M. and R.S. Waples. 1991. Status review for Snake River spring and summer chinook salmon. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-F/NWC-200. 75 p.

McLeay, D. J., G. L. Ennis, I. K. Birtwell, and G. F. Hartman. 1984. Effects On Arctic Grayling (*Thymallus arcticus*) of Prolonged Exposure to Yukon Placer Mining Sediment: A Laboratory Study. Canadian Technical Report of Fisheries and Aquatic Sciences 1241.

McLeay, D. J., I. K. Birtwell, G. F. Hartman, and G. L. Ennis. 1987. Responses of Arctic Grayling (*Thymallus arcticus*) To Acute and Prolonged Exposure to Yukon Placer Mining Sediment. Canadian Journal of Fisheries and Aquatic Sciences 44: 658-673.

Miller, D.J. and R. N. Lea. 1972. Guide to the coastal marine fishes of California. California Department of Fish and Game. Fish Bulletin Number 157. 249 p.

Monaco, M.E., D.M. Nelson, R.L. Emmett, and S.A. Hinton. 1990. Distribution and Abundance of fishes and invertebrates in west coast estuaries, Volume 1, Data summaries. ELMR Report No. 4. Strategic assessment Branch, NOS/NOAA. Rockville, MD. 240 p.

Myers, J.M., R.G. Kope, G.J. Bryant, D. Teel, L.J. Lierheimer, T.C. Wainwright, W.S. Grant, F.W. Waknitz, K. Neely, S.T. Lindley, and R.S. Waples. 1998. Status review of chinook salmon from Washington, Idaho, Oregon, and California. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-35. 443 p.

Newcombe, C. P. and D. D. MacDonald. 1991. Effects of Suspended Sediments on Aquatic Ecosystems. North American Journal of Fisheries Management 11: 72-82.

Nickelson, T.E., J.W. Nicholas, A.M. McGie, R.B. Lindsay, D.L. Bottom, R.J. Kaiser, and S.E. Jacobs. 1992. Status of anadromous salmonids in Oregon coastal basins. Oregon Department of Fish and Wildlife, Research Development Section and Ocean Salmon Management. Portland, Oregon. 83 p.

NMFS. 1997a. Biological requirements and status under 1996 environmental baseline: Umpqua River cutthroat trout, Oregon Coast coho salmon, Oregon Coast steelhead, Southern Oregon/Northern California coho salmon Klamath Mountain Province steelhead, Lower Columbia steelhead and chum salmon. NMFS, Northwest Region, Seattle, Washington.

NMFS. 1997b. Coastal coho factors for decline and protective efforts in Oregon. NMFS, Northwest Region, Habitat Conservation Program. 85 p.

NMFS. 1999. The Habitat Approach: Implementation of Section 7 of the Endangered Species Act for Actions Affecting the Habitat of Pacific Anadromous Salmonids. Guidance

memorandum from Assistant Regional Adminiator for Habitat Conservation and Protected Resources to staff. Northwest Region. 13 p.

ODFW and WDFW. 1998. Status Report Columbia River Fish Runs and Fisheries, 1938-1997. 299 pp.

Oregon Progress Board. 2000. Oregon State of the Environment Report 2000. P.G. Risser, Chair of the State of the Environment Science Panel. Published by the Oregon Progress Board, Salem, Oregon. 214 p.

Peters, R.J., B.R. Missildine, and D.L. Low. 1998. Seasonal Fish Densities near River Banks Stabilized with Various Stabilization Methods. First Year Report of the Flood Technical Assistance Project. U.S. Fish and Wildlife Service.

PFMC (Pacific Fishery Management Council). 1998a. Final Environmental Assessment/Regulatory Review for Amendment 11 to the Pacific Coast Groundfish Fishery Management Plan. October 1998.

PFMC (Pacific Fishery Management Council). 1998b. The Coastal Pelagic Species Fishery Management Plan: Amendment 8. December 1998.

PFMC (Pacific Fishery Management Council). 1999. Amendment 14 to the Pacific Coast Salmon Plan. Appendix A: Description and Identification of Essential Fish Habitat, Adverse Impacts and Recommended Conservation Measures for Salmon. Portland, Oregon.

Phillips, J. B. 1957. A review of the rockfishes of California. California Department of Fish and Game. Fish Bulletin 104. 158 p.

Phillips, J.B. 1964. Life history studies on ten species of rockfish. California Department of Fish and Game. Fish Bulletin 126. 70 p.

Redding, J. M., C. B. Schreck, and F. H. Everest. 1987. Physiological Effects on Coho Salmon and Steelhead of Exposure to Suspended Solids. Transactions of the American Fisheries Society 116: 737-744.

Roedel, P.M. 1948. Common marine fishes of California. California Department of fish and Game. Fish Bulletin 68. 153 p.

Roedel, P.M. 1953. Common ocean fishes of the California coast. California Department of Fish and Game. Fish Bulletin 91. 184 p.

Salo, E.O. 1991. Life history of chum salmon (*Oncorhynchus keta*). Pages 231-309 *in* Groot, C. and L. Margolis, eds. 1991. Pacific salmon life histories. Vancouver, British Columbia: University of British Columbia Press.

Sandercock, F.K. 1991. Life history of coho salmon (*Oncorhynchus kisutch*). Pages 395-445 *in* Groot, C. and L. Margolis, eds. 1991. Pacific salmon life histories. Vancouver, British Columbia: University of British Columbia Press.

Scannell, P.O. 1988. Effects of Elevated Sediment Levels from Placer Mining on Survival and Behavior of Immature Arctic Grayling. Alaska Cooperative Fishery Unit, University of Alaska. Unit Contribution 27.

Schmetterling, D.A., C.G. Clancy, and T.M. Brandt. 2001. Effects of riprap bank reinforcement on stream salmonids in the western United States. Fisheries 26:6-13.

Schultz, L.P. 1953. Keys to the fishes of Washington, Oregon and closely adjoining regions. University of Washington Publications in Biology Volume 2, No. 4. pp. 103-228.

Servizi, J. A. and Martens, D. W. 1991. Effects of Temperature, Season, and Fish Size on Acute Lethality of Suspended Sediments to Coho Salmon. Canadian Journal of Fisheries and Aquatic Sciences 49:1389-1395.

Sigler, J. W., T. C. Bjornn and F. H. Everest. 1984. Effects of chronic turbidity on density and growth of steelheads and coho salmon. Transactions of the American Fisheries Society 113: 142-150.

Spence, B.C., G.A. Lomnicky, R.M. Hughes, and R.P. Novitzki. 1996. An ecosystem approach to salmonid conservation. TR-4501-96-6057. ManTech Environmental Research Services Corp., Corvallis, Oregon.

Turner C.H. and J. C. Sexsmith. 1967. Marine baits of California. California Department of Fish and Game. Sacramento, California. 71 p.

Walford, L.A. 1931. Handbook of common commercial and game fishes of California. California Division of Fish and Game, Bureau of Commercial Fisheries. Fish Bulletin 28. 182 p.

Waples, R.S., O.W. Johnson, and R.P. Jones, Jr. 1991a. Status review for Snake River sockeye salmon. U.S. Dept. Commer., NOAA Tech. Memo. NMFS F/NWC-195. 23 p.

Waples, R.S., R.P. Jones, Jr., B.R. Beckman, and G.A. Swan. 1991b. Status review for Snake River fall chinook salmon. U.S. Dept. Commer., NOAA Tech. Memo. NMFS F/NWC-201. 73 p.

Weitkamp, L.A., T.C. Wainwright, G.J. Bryant, G.B. Milner, D.J. Teel, R.G. Kope, and R.S. Waples. 1995. Status review of coho salmon from Washington, Oregon and California. National Marine Fisheries Service, Northwest Fisheries Science Center, Seattle, Washington.

Appendix A

Standard Specifications and Amendments for STIP Projects

Standard Specifications (significant excerpts)

- Stabilize all soils which are exposed and disturbed during construction-related activities according to the following locales and timeframes:
  - Statewide (Entire Year) – Stabilize within 7 days of exposure, all areas within 30 meters of waterways, wetlands or other sensitive areas.
  - West of the Cascades (Entire Year) – Stabilize all other areas (i.e. >100 feet [30 m] from waterways or wetlands or other sensitive areas) within 14 days of exposure.
  - East of the Cascades (October 1 to May 1) – Stabilize all other areas (i.e. >100 feet [30 m] from waterways or wetlands or other sensitive areas) within 14 days of exposure.
  - East of the Cascades (May 1 to October 1) – Stabilize slope and embankment construction in stages based on site conditions, weather, and as determined by the Engineer.
- Temporary stabilization methods include temporary seeding, temporary mulching and other temporary cover and stabilization measures. Excerpt is from the ODOT Supplemental Standard Specifications Section 00280.43(b).
- Permanent stabilization methods include permanent seeding and mulching, riprap protection and bioengineered slope stabilization. Excerpt is from the ODOT Supplemental Standard Specifications Section 00280.43(c).

Amendments to Standard Specifications

Water Pollution Control Measures

- The Contractor shall be fully informed of the conditions of the General Conditions in the NPDES 1200-CA permit, which governs operations, and conduct construction operations accordingly.
- The Contractor shall develop a Pollution Control Plan (PCP) to prevent point-source pollution related to Maintenance operations. This plan shall satisfy all pertinent requirements of Federal, State, and Local laws and regulations, and the requirements of these special provisions. The PCP shall include the following:
  - A site plan and narrative describing the methods of erosion/sediment control to be used to prevent erosion and sediment for all aspects of the action, including disposal and staging areas, and temporary access roads.
  - Notification procedures, and methods for confining and removing and disposing of excess concrete, cement and other mortars. Also identify measures for washout facilities.
  - Containment measures adequate to prevent construction and demolition materials from entering any waterway.
  - Identify hazardous products or materials to be used. Include how they will be handled, monitored, inventoried, and stored.
- The person identified as the Erosion and Pollutant Control Manager (EPCM) shall also be responsible for the management of the Pollution Control Plan.
- The 2-year flood elevation shall be surveyed and indicated on plans or flagged on the ground prior to construction.

- Turbidity increase shall be limited to 10% above background reading as measured 100 feet (30 m) below the project, as defined in the NPDES 1200-CA permit. Construction activities shall be halted if turbidity exceeds these guidelines. Construction may recommence at the direction of the Engineer.
- No pollutants of any kind (petroleum products, fresh concrete, silt, welding slag, sandblasting abrasive, etc.) shall come in contact with the area below the 2-year floodplain.
- Containment means shall be provided and properly installed to prevent construction debris or pollutants from falling in or collecting on the surface of the water.
- Any construction debris or pollutant that accidentally falls in the water or wetlands shall be removed and properly disposed of.
- Coffer dams, or other containment facilities, shall be used to isolate the instream work area and maintain a freely flowing water. No push-up dams will be permitted.
- An oil absorbing, floating boom shall be available on-site during all phases of construction.
- No "green" or uncured concrete or water having had contact with newly poured concrete (24 hours from pour) shall come in contact with flowing water or be disposed of within wetlands or the 2-year floodplain. Use moist burlap or an approved equal to cure the concrete.
- Water used during coring, saw cutting, hydroblasting, or scarification shall be contained and prevented from entering any waterway or wetland.
- Vehicle maintenance, re-fueling of vehicles, storage of vehicles and equipment, and fuel shall be done 300 feet (90 m) from the 2-year floodplain. Containment measures adequate to prevent fuel from entering any waterway shall be implemented. These measures shall not involve any new grading, grubbing or vegetation removal.
- Place waste materials, spoils, rubble, or debris from demolition or clean up of existing highway structures, at least 300 feet (90 m) away from the 2-year floodplain and away from any wetlands. If this distance is not feasible, the spoil disposal site shall be approved by the ODOT Environmental staff.
- Any work areas are to be evacuated and all equipment, fuel, personnel, and materials, shall be removed if flooding of the area is expected within 24 hours.
- Vehicles shall not cross the active channel.
- Work within the 2-year floodplain shall be completed during the ODFW in-water work period, when practicable.
- Do not operate equipment in the active flowing stream except when necessary to excavate a toe trench.
- Staging areas shall be located at least 300 feet (90 m) above the 2-year floodplain, and shall not involve any new grading, grubbing or vegetation removal. If these requirements are not feasible, the proposed staging site shall be approved by the ODOT Environmental staff.
- An ODOT inspector shall monitor construction at least once as specified in NPDES Permit Number 1200-CA.
- If water is withdrawn from a stream, temporary water rights will be obtained.

Protection of Fish and Shellfish

- Adult and juvenile fish passage conditions shall be maintained at all times.
- Fish trapped in isolated areas shall be removed by an ODFW biologist and/or qualified and experienced ODOT or consulting biologist.
- If water is withdrawn from a stream, it will be screened according to ODFW fish screening criteria. For example, openings in perforated plate or wire screen shall not exceed 2.38 mm, screen approach velocities for ditch and active pump screens shall not exceed 0.12 meters per second, and screen approach velocities for passive pump screens shall not exceed 0.06 meters per second.

Erosion and Sediment Control

- The Contractor shall prepare an ESCP that represents actual site conditions and have it available on site during construction.
- Erosion and sediment control measures shall be implemented prior to any work within 300 feet (90 m) of a stream, and shall remain in place until the work area is stabilized.
- No fertilizers shall be applied within 50 feet (15 m) of wetlands or within 50 feet (15 m) of the 2-year flood plain of other waters of the State.
- Permanent erosion control seed mixtures shall contain only locally represented, native species.
- The Contractor shall be responsible for a 3-year plant establishment period, and that 3 years after construction, at least 70% of the mitigation plantings have survived or the mitigation area has at least 70% coverage with native species.

Temporary Work Access

- The contractor will use existing access routes and minimize new access routes whenever possible. If a new access route is required it shall minimize cut/fill of streambanks and minimize riparian vegetation removal. As amended to the ODOT Standard Specifications Section 00311.

Clearing and Grubbing

- Removal of woody riparian vegetation shall be limited to the greatest extent practicable. Vegetation or downed woody material will only be removed if it is a threat to future cut/fill slope problems or is a safety hazard. As amended to the ODOT Standard Specifications Section 00320.

Planting

The scope of the planting requirements include the furnishing, planting, and establishment period of riparian plantings.

- Existing vegetation that is designated for protection must not be disturbed unless approved by the Engineer, prior to construction. As amended to the ODOT Standard Specifications Section 01040.02.
- Only native plant materials shall be used.

- Shrub and trees shall be planted during the fall or early winter, the same year as construction. Planting work will not be permitted during the following conditions, unless otherwise approved:
  - Temperature - When air or ground temperatures are expected to below 32°F (0°C)or above 88°F (31°C).
  - Moisture - When the ground reaches saturation, except with planting wetland plants.
  - Wind - When wind velocity exceeds 40 km/hr.
- No fertilizer shall be used with the riparian plantings. As amended to the ODOT Standard Specifications Section 01040.46.
- Before starting any work defined in this Section and within 90 calendar days after award of contract, Contractor must guarantee to the Engineer (verbal or written) that a source for the native plant materials specified in the contract, has been identified. This includes permanent erosion control seed mix and mitigation shrubs. The guarantee shall include the name(s) of the nursery and/or contract grower, confirmation of availability of sufficient quantities and species by the planting season, origin of plant material, date material was collected, and proper storage method.
- The Contractor shall be responsible for a 3-year plant establishment period, and that 3 years after construction, at least 70% of the mitigation plantings have survived or the mitigation area has at least 70% coverage with native species.
- ODOT Environmental staff, or their designee shall monitor revegetation and erosion control in the project area and mitigation site, annually for 3 years. A memo or letter report shall be prepared describing the results of the surveys and success of revegetation and site stabilization.

Appendix B

Conditional Best Management Practices

Conditional BMPs for Emergencies

The following measures are applicable to maintenance repair of bank scour, landslide, or culvert emergencies.

- Erosion and sedimentation will be minimized during the emergency repairs by installing erosion/sediment control measures (for example, hay bales, silt curtains, floating silt booms, etc.) at the base of work areas, including in-channel, as appropriate for the site-specific circumstances. The measures will be implemented as soon as safely possible.
- ODOT Maintenance will use equipment that is readily available that causes the least environmental, ground, vegetation, and aquatic damage. Examples of such equipment include machines that are equipped with environmentally safer fluids, cranes or spider hoes that reduce ground disturbance, and a 360-degree rotating clam bucket instead of a bucket equipped with thumbs which would reduce ground disturbance by minimizing the amount of positioning of the excavator.
- The number and size of entry points or access roads into the work area will be minimized.
- If time and the circumstances allow, the ODFW/ODOT liaison or an ODOT Biologist will be called to advise on work area isolation and to remove fish from the isolated area.
- ODOT Maintenance Manager responsible for the repair, in coordination with Geo/Hydro staff, will minimize the use of riprap to only that which is necessary to stabilize the bank and ODOT structure, based on the best professional judgement. The amount of riprap designed will be justified in a brief report.
- Removal of riparian vegetation will be minimized during construction (including riprap installation), without jeopardizing safety.
- ODOT Maintenance will minimize the use of sediment-laden riprap below the 2-year floodplain in streams, by:
    - Stockpiling clean rock for use in emergency repairs, when possible, based on availability of stockpile sites and open-grade rock. The rock will be stockpiled at existing storage facilities or in existing cleared areas outside of ODOT "clear zone."
    - Using appropriately-sized, open-grade rock in emergency bank repairs, from the stockpiles or commercial sources, when it is readily available.
- Above the 2-year flood elevation, ODOT will use appropriately sized rock that is not open grade, if it is readily available.
- End-dumping of riprap will be minimized. Riprap will be individually placed when equipment, time, and safety allow. ODOT will document whenever end dumping is used, including location, nature of problem and emergency, reason for end dumping rather than placing, and amount of riprap used.
- Loss of construction debris or pollutants into a stream will be minimized. ODOT Maintenance will collect and properly dispose of construction debris or pollutants that collect on streambanks or wetlands when safely possible within ODOT ROW.
- ODOT Maintenance will only remove slide material that falls into a stream if work is already being conducting in the stream to protect public safety or to protect the road from further damage.
- If time and safety allow, when water is pumped from a stream, it will be screened according to ODFW fish screening criteria and temporary water rights will be obtained.

For example, openings in perforated plate or wire screen shall not exceed 2.38 mm, screen approach velocities for ditch and active pump screens shall not exceed 0.12 meters per second, and screen approach velocities for passive pump screens shall not exceed 0.06 meters per second.

- Shoulders will be rebuilt to no more than pre-existing conditions or to meet minimum safety standards.
- The slope of banks will be built to minimum safety standards.

Conditional BMPs for Urgencies

The following measures are applicable to maintenance repair of bank scour, landslide, or culvert urgencies.

- Any work below the 2-year floodplain, when practicable, will be conducted during the ODFW in-water work period. Exceptions will be coordinated with ODFW.
- ODOT will treat and design the repair as a permanent fix, as long as the repair incorporates a level of bioengineering. Otherwise, the repair will be evaluated for STIP processing.
- Direct impacts to Special Management Areas (ODOT designation for known populations of rare plants) will be avoided, unless the repair is necessary at the location of a SMA, or there is no alternative location for equipment staging or site access. An ODOT Biologist will be contacted if a SMA cannot be avoided, and will advise on site-specific avoidance, minimization, and/or revegetation measures.
- ODOT Maintenance will use equipment that is readily available that causes the least environmental ground, vegetation, and aquatic damage. Examples of such equipment include machines that are equipped with environmentally safer fluids, cranes or spider hoes that reduce ground disturbance, and a 360-degree rotating clam bucket instead of a bucket equipped with thumbs which would reduce ground disturbance by minimizing the amount of positioning of the excavator.
- The number and size of entry points or access roads into the work area will be minimized.
- Removal of riparian vegetation (live and instream structure) will be minimized during construction (including riprap installation).
- If live riparian vegetation must be removed, it will be trimmed at the ground surface, not grubbed.
- Adequate containment measures will be provided and properly installed to prevent pollutants and construction debris (for example, petroleum products, fresh concrete, silt, welding slag, sandblasting abrasive, etc.) from falling in or collecting on the surface of the water or below the 2-year floodplain, unless restricted by access or safety. Exceptions will be documented.
- If adequate containment measures cannot be implemented, vehicle maintenance, re-fueling of vehicles, storage of vehicles and equipment, and fuel will be done 150 feet (50 m) from the 2-year floodplain where ODOT ROW is available, and inadvertent loss of construction debris or pollutants will be removed from streambanks or wetlands when safely possible.
- Fertilizer use will be minimized at sites within 50 feet (15 m) of wetlands, the 2-year floodplain, or other waters of the United States.

- Shoulders will be rebuilt to no more than pre-existing conditions or to meet minimum safety standards.
- The slope of banks will be built to minimum safety standards.

Interim BMPs for Urgency Repairs or STIP Proposals

The following practices will be conducted by ODOT Maintenance to stabilize emergency or urgency problems, as necessary to minimize erosion and sedimentation, when the repair will be delayed, either as an urgent repair or when the repair is to be proposed for STIP processing:

- Emergency or urgency bank stabilization repairs will be conducted, as needed to prevent further failure, open the road, and protect public safety, according to Conditional and Mandatory BMPs listed above.
- When safely and structurally possible, debris and sediment will be cleared from blocked culverts to maintain a freely flowing stream for sufficient fish passage.
- ODOT Maintenance will stabilize exposed soil with erosion controls and reseeding (hydroseeding or comparable alternative).

Appendix C

Manadory Best Management Practices

Mandatory BMPs for Emergencies

The following practices will be conducted during Maintenance repair of bank scour, landslide, or culvert emergencies.

- If a toe must be established below the 2-year floodplain, it will be created with adequately sized rock (as determined by best professional judgement) and using an irregular pattern.
- Banks will be built up with large enough riprap that it would not be dislodged in a high water storm event. The size of the rock will be based on best professional judgement.
- ODOT will permanently stabilize exposed soil that has fallen onto the streambank, both within and outside of the ODOT ROW. The permanent stabilization within ROW will include erosion controls and re-seeding (hydroseeding or comparable alternative). The permanent stabilization outside of ROW will be limited to re-seeding. If the repair involved disturbance to a SMA, site-specific remediation will be discussed at the semi-annual meetings.
- ODOT will determine if the repair that was implemented is permanent or temporary, and if site remediation is required, during semi-annual meetings. A subsequent repair may be proposed for STIP Processing.

Mandatory BMPs for Urgencies

The following practices will be conducted during Maintenance repair of bank scour, landslide, or culvert urgencies.

- ODOT will use some level of bioengineering for the design.
- The repair will not involve any channel changes.
- ODOT will coordinate with ODFW and/or an ODOT Biologist for isolating the work area from the actively flowing channel and removing fish, as appropriate. If they determine that isolation is necessary, flow will be diverted around the work area by building a coffer dam with materials such as bladder bags, sand bags, silt curtain, or Port-a-Dam. Push-up dams (i.e., when the natural substrate is used to create the dam) will not be permitted.
- If water is required for the repair or site stabilization, it will be obtained from a municipal source, or if water is pumped from a stream, it will be screened according to ODFW fish screening criteria. For example, openings in perforated plate or wire screen shall not exceed 2.38 mm, screen approach velocities for ditch and active pump screens shall not exceed 0.12 meters per second, and screen approach velocities for passive pump screens shall not exceed 0.06 meters per second. If water is withdrawn from a stream, temporary water rights will be obtained, if time allows.
- Natural obstructions (such as woody material) will be removed from a stream only if necessary to protect a downstream structure. They will be removed by passing the obstructing material downstream, or if there is an immediate downstream threat, the material will be removed to an ODOT-designated disposal site.
- Erosion and sedimentation will be minimized during the repair by installing erosion/sediment control measures (for example, hay bales, silt curtains, floating silt booms, etc.) at the base of work areas, including in-channel, as appropriate for the site-specific circumstances. The measures will be in place and maintained, as appropriate, prior to conducting the repair.

- ODOT Maintenance Manager responsible for the repair, in coordination with Geo/Hydro staff, will minimize the use of riprap to only that which is necessary to stabilize the bank and ODOT structure, based on the best professional judgement. The amount of riprap designed will be justified in a brief report.
- If riprap is used, appropriately sized rock will be used. Below the 2-year flood elevation it will be open grade, while above the 2-year flood elevation it will not.
- If a toe must be established below the 2-year floodplain, it will be created with adequately sized riprap and using an irregular pattern.
- Riprap will be individually placed, except under the following circumstances, when it may be end-dumped:
    - The reach is greater than that of the equipment; or
    - To establish a toe until reach with equipment is possible.
    - To fill in behind the toe if it is stable and isolating the work area from any actively flowing water. No riprap will extend beyond the toe.
- ODOT will document whenever end dumping is used, including location, nature of problem and urgency, reason for end dumping rather than placing, amount of riprap used.
- If riparian vegetation must be cleared, it will be trimmed at the ground surface.
- ODOT will permanently stabilize exposed soil that has fallen onto the streambank, both within and outside of the ODOT ROW. The permanent stabilization within ROW will include erosion controls and reseeding (hydroseeding or comparable alternative). The permanent stabilization outside of ROW will be limited to reseeding only. Permanent revegetation will incorporate native seeds and native plants when materials are available within project scheduling.
- ODOT will determine if the repair that was implemented is permanent or temporary, and if site remediation is required, during semi-annual meetings. A subsequent repair may be proposed for STIP Processing.
- If the culvert must be replaced, ODOT Geo/Hydro staff and ODFW will be consulted with for advice on fish passage issues.